

Surveys for Animal Species of Concern in Sage and Grassland Landscapes in Montana

Prepared for:

Montana Department of Fish, Wildlife & Parks
State Wildlife Grants Program
Helena, Montana

Compiled By:

Susan Lenard

Montana Natural Heritage Program
Natural Resource Information System
Montana State Library

May 2005



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SUMMARY

Four projects conducted in grass and sage habitats in eastern Montana in 2003 and 2004 to document the presence of Montana Species of Concern were made possible by a grant from the State Wildlife Grants Program administered by the Montana Department of Fish, Wildlife, and Parks (MTFWP). In addition to target species, all other encountered species of concern were documented during field activity. Project activity occurred from March through October of each year; the timing for each project was appropriate to the breeding season of the species in question, or to a time that was most conducive for assessing targeted species activity.

One-hundred-two bird point counts were conducted in June 2004 to survey for grassland birds on the Gordon Ranch in Blaine County, Montana, an approximately 15,000 acre ranch on which the Montana Department of Fish, Wildlife & Parks holds a conservation easement. Surveys were conducted on pastures of two different grazing regimes; rested and grazed. Of the fifty-two species of birds recorded on the ranch, eleven were state species of concern. Several species of concern were the most abundant of all birds encountered on the property.

Surveys were performed in sixty-two sites in Sheridan, Roosevelt and Daniels counties to document distribution of four species of concern specific to that area of the state. The four targeted species include Yellow Rail (*Coturnicops noveboracensis*), Sedge Wren (*Cistothorus platensis*), Nelson's Sharp-tailed Sparrow (*Ammodramus nelsoni*), and LeConte's Sparrow (*Ammodramus leconteii*). The surveys were conducted between June 2 and July 24 of 2004. The initial surveys occurred early in June, with follow-up surveys to document breeding evidence in mid-to-late July. Three of the targeted species were documented during the survey period. Seventeen additional species of concern in Montana were identified during the surveys: fifteen bird species, one frog and one snake species.

Aerial surveys were conducted in southeastern Montana during 2004 to document black-tailed (*Cynomys ludovicianus*) and white-tailed prairie dog (*Cynomys leucurus*) activity. The study area for this project consisted of three distinct survey locations in the southeastern portion of the state; the primary survey area extended from the Montana/Wyoming

state line north to the Charles M. Russell (CMR) National Wildlife Refuge along the Missouri River, and from the Montana/North Dakota and South Dakota state lines west to the line formed by Highways 87, 19, and 191. The second survey area included land southwest and northwest of Roundup in Yellowstone, Wheatland, Golden Valley, Stillwater, and Musselshell Counties. The third area included portions of Carbon County where white-tailed prairie dogs are known to exist. Nearly 1800 black-tailed prairie dog colonies were recorded during more than one hundred thirty hours of flight time. All were generally located in distinct geographic areas; with approximately half of the colonies less than ten acres in size. New white-tailed prairie dog colonies were identified in southern Carbon County, but on-the-ground verification will be needed to confirm activity.

Surveys were conducted for small mammal species of concern on sage-dominated habitats in Beaverhead, Carbon, Custer, Garfield, Petroleum, Powder River, Powell, Prairie, and Valley counties from June through October of 2003 and 2004. Eight different species of small mammals were caught over the course of 3600 bait-trap and 230 pitfall trap nights. This project was designed specifically to provide information on the distribution of four small mammal state species of concern; Preble's Shrew (*Sorex preblei*), Dwarf Shrew (*Sorex nanus*), Merriam's Shrew (*Sorex merriami*), Great Basin Pocket Mouse (*Perognathus parvus*), and other sagebrush associated small mammals in the state of Montana.

As a small side-project, information on the Blue-gray Gnatcatcher (*Poliophtila caerulea*), a state species of concern, was gathered during 2004 breeding season. This species is rare to the state and of limited distribution; it has been reported from only three locations in Montana (Pryor Mountains, Westby, and the northeast corner of Fort Peck Reservoir) over a total of thirteen separate documented observations (MBD 2005). Limited information is available on nesting events in the state, and as the Heritage program staff was involved in another project in the general area, they took the opportunity to investigate the presence of Blue-gray Gnatcatchers in one of the known areas of occurrence in order to understand their breeding status.

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INTRODUCTION

For decades, Montana's sagebrush and prairie lands have been converted to other uses, resulting in ever-diminishing acreage and quality of habitat for the species that inhabit this unique landscape. The events in Montana are mirrored around the globe; grasslands are identified as one of the most imperiled ecosystems in the world (Samson and Knopf 1996). In addition to being fragmented by agricultural conversion, much of the remaining native grass and sage lands are being degraded by poor management or continued alteration through mechanical and chemical (principally for sagebrush removal) activities. The greatest limiting factors in managing these lands for the long-term benefit of native species is lack of specific information on the diversity, distribution (current and historic), and requirements of the species utilizing these habitats. Gaining a better understanding of the array of species that depend upon our prairie lands, and the dynamic interactions between them, will help direct management efforts toward their sustained existence. This collection of projects was designed to gather distribution information (and breeding status, where possible) for several state species of concern in sage and grassland habitats of eastern Montana.

Funding for this project was provided to the Montana Natural Heritage Program by the Montana Department of Fish, Wildlife, & Parks through the State Wildlife Grants Program. The State Wildlife Grants (SWG) program was created by congressionally appropriated funds to assist states in the development and implementation of programs that benefit wildlife and their habitats. Information gathered during these projects has been incorporated into databases maintained by the Montana Natural Heritage Program.

This document contains four separate reports on animal species of concern in Montana. These individual projects were designed to address gaps in our knowledge about sage and grass species in Montana. Targeted species of concern included several endemic grassland bird species, sagebrush and grassland associated mammals, and bird species associated with unique wetland

habitats located within the grassland matrix of the northeastern corner of the state. Additionally, other species of concern encountered during these surveys were documented.

Lands in eastern Montana support a unique array of breeding grassland bird species found only in the Northern Great Plains; the importance of this habitat for a host of endemic species cannot be overstated. Unfortunately, fragmentation and degradation of this habitat which is critical to the survival of nine primary prairie bird species, and nearly twenty more secondary species, continues. Remnant pieces of native prairie have increasingly become more important to this collection of prairie specific breeders. Recognizing this importance, the Montana Department of Fish, Wildlife & Parks secured a conservation easement on a sizable ranch in northern Blaine County. The report included in this document describes a point count survey project conducted by the Montana Natural Heritage Program in June of 2004. The survey was designed to document the diversity and general abundance of prairie bird species on the ranch in grazed and rested pastures.

Four bird species of concern were identified for survey in the grasslands of Northeastern Montana. Each of these species is considered rare in the state (less than 20 documented observations) (MBD 2005). All four of these target species are known to utilize specific wetland locations within Northeastern Montana's grasslands, but little information is available about their breeding status or the full extent of their distribution in this area; LeConte's (*Ammodramus leconteii*) (G4,S1S2B) and Nelson's Sharp-tailed Sparrows (*Ammodramus nelsoni*) (G5,S1B) have been documented as breeding at least once while no direct evidence of breeding has been recorded for Yellow Rail (*Coturnicops noveboracensis*) (G4,S1B) or Sedge Wren (*Cistothorus platensis*) (G5,S1B) (MBD 2005). The purpose of this study was to document distribution and gather evidence of breeding for these species in Sheridan, Roosevelt and Daniels Counties.

Long considered a pest in competition with cattle for rangeland resources, prairie dogs have been the focus of eradication programs designed to reduce their numbers across the Great Plains as early as the 1880s. Greatly reduced in number and distribution throughout their range, the species has only recently been recognized as an integral component of a healthy functioning prairie ecosystem (Foresman 2001). A myriad of prairie species depend upon the presence of prairie dog colonies for habitat and a source of food. The appearance of sylvatic plague in Montana in the mid-1980s sparked concern over the status of black-tailed (*Cynomys ludovicianus*) (G4,S3) and white-tailed prairie dogs (*Cynomys leucurus*) (G4,S1) across the state (FaunaWest 1999). Subsequent investigations into the full extent and status of existing prairie dog colonies in Montana, however, were hampered by limited access to lands that required permission from private landowners. This included both private and public lands. Since a petition to list the species under the Endangered Species Act in 2000 resulted in a finding of “warranted but precluded”, increasing attention has been focused on gaining a better understanding of the viability of prairie dog populations across their historic range. Our project was designed to use aerial surveys to catalogue extant prairie dog colonies in southeastern Montana, allowing coverage of lands otherwise precluded from inventory. The project was envisioned to give the most complete assessment of activity of both prairie dog species across the greatest known area of occupancy in the state.

Four species of small mammals associated with sagebrush habitats are listed as species of conservation concern in Montana: Preble’s Shrew (*Sorex preblei*) (G4,S3), Dwarf Shrew (*Sorex nanus*) (G4,S2S3), Merriam’s Shrew (*Sorex merriami*) (G5,S3), and Great Basin Pocket Mouse (*Perognathus parvus*) (G5,S2S3). Each species is identified as uncommon, rare, or only locally common (Foresman 2001). As limited information is available on the distribution and abundance of these species in Montana, and few specimens have been collected in the state, we realized that targeted surveys could contribute greatly to their conservation.

Finally, between 29 May and 10 June 2004, investigations into Blue-gray Gnatcatcher (*Polioptila caerulea*) (G5,S1B) activity in Bear Canyon, Pryor Mountains, revealed a total of five pairs and one lone male individual. Breeding evidence was documented with two nests, accounting for the eleventh and twelfth documented nesting events by the species in the state. During the field survey, Brown-headed Cowbirds (*Molothrus ater*) were also observed, (the first time the species was recorded in this area) and parasitism of a nest of Blue-gray gnatcatchers was documented in 2003. This was the first documentation of parasitism by Brown-headed Cowbirds on Blue-gray Gnatcatchers in the state. Both of the nests were located in dead sagebrush (*Artemisia spp.*) measuring 175 and 245 centimeters in height, with the nests 94 and 140 centimeters above ground, respectively. Upon first discovery, the first nest contained one Blue-gray Gnatcatcher egg and the second contained three Blue-gray Gnatcatcher eggs and two Brown-headed Cowbird eggs. Examination the next day revealed the contents of two Blue-gray Gnatcatcher eggs and one Brown-headed Cowbird egg, the second nests’ contents were the same as the previous day. No further information on the fate of the nests is available as no further visits were made to the site. Limited SWG funds were used during this investigation as the Montana Natural Heritage Program zoologist was performing other work in the general locale. Information on this project is limited to this section; no report is attached.

SECTION 1

BIRDS OF THE GORDON RANCH, BLAINE COUNTY, MONTANA

Birds of the Gordon Ranch, Blaine County, Montana: Point Count Surveys 2004

Prepared for:
Montana Department of Fish, Wildlife & Parks
Helena, Montana

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**Montana Natural Heritage Program
Natural Resource Information System
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SUMMARY

In June 2004, point count surveys were conducted on the Gordon Cattle Company north of Zurich, Montana, a recently acquired conservation easement of the Montana Department of Fish, Wildlife & Parks, to gather baseline information on the bird species of the property. The point counts were confined to two units comprising approximately 15,000 acres and identified the bird communities present across different grazing regimes in place on the ranch. Of the 52 species of birds documented on the property, 11 are state Species of Concern, and include Baird's Sparrow (*Ammodramus bairdii*), Brewer's Sparrow (*Spizella breweri*), Burrowing Owl (*Antheus cunicularia*), Chestnut-collared Longspur (*Calcarius ornatus*), Franklin's Gull (*Larus pipixcan*), Lark Bunting (*Calamospiza melanocorys*), Loggerhead Shrike (*Lanius ludovicianus*), Long-billed Curlew (*Numenius americanus*), McCown's Longspur (*Calcarius mccownii*), Sprague's Pipit (*Anthus spragueii*), and Swainson's Hawk (*Buteo swainsoni*) (MTNHP 2004). An additional species, Short-eared Owl (*Asio flammeus*) a species of potential conservation concern, was also documented on the ranch. This project was made possible by a grant from the State Wildlife Grants Program administered by Montana Department of Fish, Wildlife and Park.

ACKNOWLEDGEMENTS

We thank Jim Hansen and Rick Northrup of the Montana Department of Fish, Wildlife & Parks for their assistance in the development and realization of this project. We are grateful for the opportunity to work on the Gordon Cattle Company property. Appreciation is extended to the Montana Department of Fish, Wildlife & Parks for SWG funding for this project. Paul Hendricks contributed suggestions improving this document.

INTRODUCTION

The grasslands of north-central Montana lie in the heart of breeding habitat for a host of bird

species found only in the Northern Great Plains. Eight of nine bird species endemic to grasslands breed on Montana's prairie lands. All of them are classified as State Species of Concern by the Montana Natural Heritage Program and Montana Fish, Wildlife & Parks (FWP), as well as Priority Species of conservation concern by Montana Partners in Flight (Casey 2000, MTNHP 2004). An additional fifteen to twenty more-widespread prairie bird species breed on these same lands (Samson & Knopf 1996).

Population declines of prairie birds over the past several decades have created an increased awareness of the importance of these native grasslands. To this end, FWP investigated the opportunity to place under conservation easement lands that provide important breeding habitat to a host of native grassland bird species.

DESCRIPTION OF PROJECT

In 2004, FWP contracted the Montana Natural Heritage Program to conduct point counts on a recently acquired conservation easement parcel in north Blaine County. The purpose of the project was to develop baseline information on the grassland birds of the property. The point counts were conducted in mid-June on the Gordon Cattle Company Conservation Easement north of Zurich, Montana and were confined to two units comprising 15,157 acres of the ranch. As a grazing system was in place on the ranch, FWP requested that half of the points be located in pastures that were ungrazed (rested) last year (2003) and half that were grazed (grazed) late last year.

GENERAL LOCATION INFORMATION

Located within the northern glaciated plains, Blaine County is generally dominated by a landscape of mid and short grasses. The dominant species present in the northern portion of the county, where the Gordon Ranch is located, include western wheatgrass (*Agropyron smithii*), green needlegrass (*Stipa viridula*), needle-and-thread (*Stipa comata*), prairie junegrass (*Koeleria macrantha*), blue grama

(*Bouteloua gracilis*), winterfat (*Heninnikovia lanata*), and silver sagebrush (*Artemisia cana*). The soils were formed in glacial till and are nearly level to steep, deep, shallow and well-drained. The average annual precipitation ranges from 10 to 14 inches, with a frost-free season of 100 to 125 days. Rangeland and dryland farming are the dominant land uses, with a few areas used for irrigated crops (Soil Conservation Service 1986).

METHODS

A. Project Design and Point Selection

Points on the Gordon Ranch lands were stratified by grazing regime and randomly selected. Two ranch land units were visited during this project, the Border Unit and the Fifteenmile Unit. Based upon information provided by FWP, the Southwest and Middle West pastures of the Border Unit were grazed early (mid-May to 31 July) in 2003, while the Meridian, Northwest, and Southeast pastures in this unit were grazed late in the season (August to early fall, 2003). The two remaining pastures in the Border Unit, the Middle East and Northeast, as well as all pastures within the Fifteenmile Unit were not grazed in 2003.

Each randomly chosen point established the first point of a three-point transect. The second and third points were each located on the ground by field personnel by walking no less than 300 meters from the previous point, keeping the points in the same pasture/grazing treatment, resulting in a total 3-point transect distance of approximately 600 meters. Global positioning coordinates were recorded using Garmin GPS units (GPSmap76) at each of the three points along the transect. Transects were oriented to keep all points of a transect within a single grazing unit (see Appendix A and B).

A total of 102 point counts were conducted on the Gordon Ranch during 21-29 June 2004. Seventeen transects (three points each), a total of 51 point counts, were conducted in each of the grazed and rested pastures.

Travel was restricted to existing roads and two-tracks. No travel, other than by foot, occurred cross-country. Vehicle under-carriages were power-washed prior to survey work to remove weed seeds that may have been present.

B. Point Count Methodology

All point counts were ten minutes in duration and were completed within the first five hours after sunrise. Each point count was conducted by recording birds observed during time intervals of zero to three minutes, three to five minutes, and five to ten minutes. All birds detected visually and/or aurally within a 100 meter radius circle from the fixed transect point were recorded, with each individual species documented with the appropriate 4-letter AOU code, abundance noted, and identified as observed within the 100-meter circle, or outside (this includes birds that flew over head during the count interval). Counts were not conducted if continuous rain or high winds were present.

RESULTS

A total of 43 species of birds were recorded during grassland point count work on the Gordon Ranch (see table 1). An additional nine species were observed and documented on the Gordon Ranch during the field visit. Eleven of the 52 species documented on the property are state species of concern, and include Baird's Sparrow (*Ammodramus bairdii*), Brewer's Sparrow (*Spizella breweri*), Burrowing Owl (*Anthe cunicularia*), Chestnut-collared Longspur (*Calcarius ornatus*), Franklin's Gull (*Larus pipixcan*), Lark Bunting (*Calamospiza melanocorys*), Loggerhead Shrike (*Lanius ludovicianus*), Long-billed Curlew (*Numenius americanus*), McCown's Longspur (*Calcarius mccownii*), Sprague's Pipit (*Anthus spragueii*), and Swainson's Hawk (*Buteo swainsoni*) (MTNHP 2004). An additional species, Short-eared Owl (*Asio flammeus*) a species of potential conservation concern, was also documented on the ranch. Twenty-two species are identified as Priority Species by Montana Partners in Flight (Casey 2000), as species either in need of conservation action (I), in need of monitoring (II), or of local concern (III) (Table 1).

Direct evidence of breeding was confirmed (discovery of active nests) for Chestnut-collared Longspur, Cliff Swallow (*Petrochelidon pyrrhonota*), Horned Lark (*Eremophila alpestris*), McCown's Longspur, Northern Shoveler (*Anas clypeata*), Red-winged Blackbird (*Agelaius phoeniceus*), Swainson's Hawk, Sharp-tailed Grouse (*Tympanuchus phasianellus*),

Vesper Sparrow (*Pooecetes gramineus*), and Willet (*Catoptrophorus semipalmatus*). Breeding is presumed for other species recorded during the point counts as the field inventory occurred during the breeding season and observations included singing males and territorial displays in appropriate breeding habitat.

Table 1: Species list for Gordon Ranch Property

Species Common Name	Scientific Name	State SOC list rank	MT PIF Rank
American Avocet	<i>Recurvirostra americana</i>		
American Crow	<i>Corvus brachyrhynchos</i>		
American Coot	<i>Fulica americana</i>		
American Kestrel*	<i>Falco sparverius</i>		
American Wigeon*	<i>Anas americana</i>		
Baird's Sparrow	<i>Ammodramus bairdii</i>	S2B	I
Barn Swallow	<i>Hirundo rustica</i>		
Blue-winged Teal	<i>Anas discors</i>		
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>		III
Brewer's Sparrow	<i>Spizella breweri</i>	S2B	II
Brown-headed Cowbird	<i>Molothrus ater</i>		
Burrowing Owl*	<i>Anthene cunicularia</i>	S2B	I
California Gull	<i>Larus californicus</i>		
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	S3B	II
Clay-colored Sparrow	<i>Spizella pallida</i>		III
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>		
Common Nighthawk	<i>Chordeiles minor</i>		
Common Tern	<i>Sterna hirundo</i>		II
Eared Grebe	<i>Podiceps nigricollis</i>		
Eastern Kingbird	<i>Tyrannus tyrannus</i>		
Franklin's Gull	<i>Larus pipixcan</i>	S3B	II
Gadwall	<i>Anas strepera</i>		
Gray Partridge*	<i>Perdix perdix</i>		
Horned Lark	<i>Eremophila alpestris</i>		
Killdeer	<i>Charadrius vociferus</i>		III
Lark Bunting	<i>Calamospiza melanocorys</i>	S3B	II
Least Flycatcher	<i>Empidonax minimus</i>		III
Loggerhead Shrike*	<i>Lanius ludovicianus</i>	S3B	II
Long-billed Curlew	<i>Numenius americanus</i>	S2B	II
Mallard	<i>Anas platyrhynchos</i>		
Marbled Godwit	<i>Limosa fedoa</i>		II
McCown's Longspur	<i>Calcarius mccownii</i>	S2B	II
Mourning Dove	<i>Zenaida macroura</i>		
Northern Harrier	<i>Circus cyaneus</i>		III

Northern Pintail	<i>Anas acuta</i>		
Northern Shoveler	<i>Anas clypeata</i>		
Redhead*	<i>Aythya americana</i>		
Red-necked Grebe*	<i>Podiceps grisegena</i>		
Red-winged Blackbird	<i>Agelaius phoeniceus</i>		III
Ring-billed Gull	<i>Larus delawarensis</i>		
Ruddy Duck	<i>Oxyura jamaicensis</i>		
Savannah Sparrow	<i>Passerculus sandwichensis</i>		
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>		
Short-eared Owl	<i>Asio flammeus</i>	S3S4 (potential)	III
Sprague's Pipit	<i>Anthus spragueii</i>	S2B	I
Swainson's Hawk	<i>Buteo swainsoni</i>	S3B	III
Vesper Sparrow	<i>Poocetes gramineus</i>		
Western Meadowlark	<i>Sturnella neglecta</i>		
Willet	<i>Catoptrophorus semipalmatus</i>		III
Wilson's Phalarope	<i>Phalaropus tricolor</i>		III
Wilson's Snipe*	<i>Gallinago delicata</i>		
Yellow Warbler*	<i>Dendroica petechia</i>		

*species recorded on the Gordon Ranch property, but not during point counts

Montana Animal Species of Concern

(S=state status)

S2B – At risk during breeding because of very limited and/or declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state.

S3B – Potentially at risk during breeding because of limited and/or declining numbers, range, and/or habitat, even though it may be abundant in some areas.

Montana Partner's in Flight Priority Levels

I Conservation Action: these are species for which Montana has clear obligations to implement conservation.

II Monitoring Species: Montana has a high responsibility to monitor the status of these species, and/or to design conservation actions.

III Local Concern: Presence of these species may serve as added criteria in the design and selection of conservation or monitoring strategies (Casey 2000).

BIRDS OF RESTED AND GRAZED PASTURES

Thirty-eight species of birds were recorded on the rested parcels. Of these species, eight were state species of concern and included, in decreasing order of abundance, Chestnut-collared Longspur, Sprague's Pipit, Baird's Sparrow, McCown's Longspur, Lark Bunting, Brewer's Sparrow, Franklin's Gull, and Long-billed Curlew (see Table 2). Twenty-four species recorded during the point counts were common to both the rested and grazed plots, while fourteen species were specific to the rested pastures: American Coot, Brewer's Sparrow, California Gull, Cliff Swallow, Common Tern,

Eared Grebe, Franklin's Gull, Gadwall, Northern Shoveler, Ring-billed Gull, Ruddy Duck, Sharp-tailed Grouse, and Short-eared Owl. Two short-grass prairie species specific to the rested pastures, the Brewer's Sparrow and the Short-eared Owl, are listed on the state species of concern list (the Short-eared Owl as a potential species of concern).

Thirty species were documented on the grazed pastures (see Table 3), seven of which were state species of concern. Listed in decreasing order of abundance they include Chestnut-collared

Longspur, McCown's Longspurs, Baird's Sparrow, Sprague's Pipit, Lark Bunting, Long-billed Curlew, and Swainson's Hawk. Six species of birds were specific to the grazed points: American Avocet, American Crow, Eastern Kingbird, Least Flycatcher, Northern Pintail, and Swainson's Hawk. Breeding was confirmed for one state species of concern, the Swainson's Hawk, with the discovery of an active nest.

The Chestnut-collared Longspur, a state species of concern, was the most abundant and widely distributed species on point counts during the summer 2004 on the Gordon Ranch. This species was recorded on 48 of the 51 rested points (total of 262 individuals) and 44 of the 51 grazed points (total of 269 individuals). Chestnut-collared Longspurs are known to utilize habitat with moderately heavy grazing to no grazing pressure (Samson and Knopf 1996). The Chestnut-collared Longspur (along with the Sprague's Pipit, Baird's Sparrow, Lark Bunting, and McCown's Longspur) is identified as one of the primary (endemic) passerine species of the Great Plains (Samson and Knopf 1996).

The second most abundant and widely distributed species across the property was the Horned Lark, a species generally common to eastern Montana. Horned Larks, like the Western Meadowlark, are a secondary (or more widespread) species of the prairie, and are not considered Great Plains grassland endemic species (Samson and Knopf 1996).

The second most encountered species of concern on the rested pastures was the Sprague's Pipit. This species was also the fourth most recorded species of concern on the grazed pastures. This pipit species tends to favor grasslands with moderate to no grazing, and whose breeding is restricted to appropriate mixed-grass habitat primarily in three states (Montana, North Dakota, and South Dakota) and three provinces (Alberta, Saskatchewan, and Manitoba) (Samson and Knopf 1996, Johnsgard 2001). The breeding habitat of this species, and also the Baird's Sparrow, is one of the most limited for grassland endemics (Johnsgard 2001). Unlike a few species of the prairie, Sprague's Pipits are far more abundant in native grassland than in

haylands or croplands, and may be fully absent in pastures dominated by non-native species (Robbins and Dale 1999, Johnsgard 2001). Grasslands of intermediate height and density with moderate litter depths are preferred (Robbins and Dale 1999).

The Baird's Sparrow, already noted as an endemic prairie species confined to the northern Great Plains, prefers mixed-grass and fescue prairie with a scattering of low shrubs and residual vegetation (Green et al. 2002). The Baird's Sparrow was the third most abundant species of concern on both rested and grazed pastures (fifth most abundant, overall, on the rested; fourth most abundant, overall, on the grazed). This species prefers large blocks of lightly grazed to ungrazed midgrass prairie, and is described as "not extremely abundant anywhere in its range" (Johnsgard 2001).

McCown's Longspurs were the fourth most abundant species of concern on the rested pastures (eighth most abundant, overall) and the second most encountered species of concern on the grazed plots (third most abundant, overall). This species, similar to the Horned Lark, prefers a more heavily grazed landscape for nesting and can be found in areas of moderate to very heavy grazing pressure (With 1994, Samson and Knopf 1996). Distribution of this species is primarily restricted to sparsely vegetated and open semi-arid shortgrass habitat, or overgrazed pastures generally comprised of shortgrass species mixed with limited cover of mid-grass species, shrubs, and cactus (With 1994). Breeding of the McCown's Longspur may occur in the same general location as that of the Chestnut-collared Longspur, but rarely will they breed in the same pasture unless a mosaic of both short and mid-grasses are present (With 1994).

Another Great Plains prairie endemic species, the Lark Bunting prefers areas of light to moderately-heavy grazing pressure (Samson and Knopf 1996). Breeding generally takes place in large open grasslands of low to moderate height with limited open ground and the presence of some scattered shrubs, such as sagebrush (Johnsgard 2001). Timing of grazing may play a large role in the suitability of breeding sites;

heavy summer grazing has been found to be detrimental (Shane 2000). The Lark Bunting was more common on the grazed than rested pastures during the 2004 field survey.

The only non-passerine prairie endemic bird species found on the Gordon Ranch, the Long-billed Curlew prefers moderate to heavily grazed short to mixed grassland (the other non-passerine endemics are the Mountain Plover [*Charadrius montanus*] and Ferruginous Hawk [*Buteo regalis*]) (Samson and Knopf 1996, Dugger and Dugger 2002). This species was more abundant on the grazed than rested pastures. In general, the Long-billed Curlew will select nesting sites in open, sparsely vegetated prairie, while sites with taller, denser grass is preferred for brood rearing (Dugger and Dugger 2002).

The Brewer's Sparrow is the one species of concern discovered on the Gordon Ranch that is more closely associated with a big sagebrush (*Artemisia tridentata*) dominated landscapes than short or mid-grass prairie (Rotenberry et al.

1999). This sparrow generally prefers shrubby habitat with low shrub species diversity, limited grass, higher forb presence and significant bare ground (Johnsgard 2001).

Generally a species of a grassland or shrubland landscape, the Swainson's Hawk typically nests in trees scattered within this matrix. If trees are not present, then willow (*Salix* spp.) along riparian areas may also be utilized for nesting sites (England et al. 1997). In addition to foraging in native grasslands, agricultural crops may also be used for foraging, if prey is present and the crop height does not exceed that of native grasses (England et al. 1997).

Nesting on water, the Franklin's Gull builds a floating mat or utilizes floating debris or muskrat houses as a platform for a nest site. Rarely will the species nest in flooded meadows (Burge and Gochfeld 1994). Only a few nesting locations have been documented in Montana; Bowdoin National Wildlife Refuge in Phillips County is the nearest recorded nesting location to the Gordon Ranch (MBD 2005).

Table 2. Species list and abundance on Rested Plots

Species Common Name	Total individuals	Total points where species was present (n=51)
Chestnut-collared Longspur*	262	48
Horned Lark	161	45
Western Meadowlark	94	46
Sprague's Pipit*	57	38
Baird's Sparrow*	55	32
Savannah Sparrow	26	15
Vesper Sparrow	23	17
McCown's Longspur*	21	11
Brewer's Blackbird	17	7
Marbled Godwit	13	10
Red-winged Blackbird	13	4
Willet	8	7
Common Tern	8	3
Brown-headed Cowbird	7	5
Clay-colored Sparrow	7	4
American Coot	7	3
Cliff Swallow	7	3
Northern Shoveler	7	2
Lark Bunting*	5	5
Brewer's Sparrow*	4	3
Mallard	4	1
Ruddy Duck	4	1
Sharp-tailed Grouse	4	1
Killdeer	3	3
Northern Harrier	3	3
Franklin's Gull*	3	2
Ring-billed Gull	3	2
Wilson's Phalarope	3	2
California Gull	2	2
Short-eared Owl	2	2
Barn Swallow	2	1
Eared Grebe	2	1
Blue-winged Teal	1	1
Common Nighthawk	1	1
Gadwall	1	1
Long-billed Curlew*	1	1
Mourning Dove	1	1
Upland Sandpiper	1	1

* state species of concern

Table 3. Species list and abundance on Grazed Plots

Species Common Name	Total individuals	Total points where species was present (n=51)
Chestnut-collared Longspur*	269	44
Horned Lark	166	44
McCown's Longspur*	82	37
Baird's Sparrow*	74	41
Western Meadowlark	59	39
Sprague's Pipit*	44	35
Vesper Sparrow	22	17
Savannah Sparrow	21	13
Brown-headed Cowbird	17	8
Lark Bunting*	14	4
Brewer's Blackbird	8	5
Clay-colored Sparrow	8	4
Long-billed Curlew*	7	6
Blue-winged Teal	6	2
Marbled Godwit	4	3
Northern Harrier	3	2
Swainson's Hawk*	3	2
Willet	3	2
American Avocet	2	1
American Crow	2	1
Killdeer	2	2
Mallard	2	1
Red-winged Blackbird	2	2
Wilson's Phalarope	2	1
Barn Swallow	1	1
Common Nighthawk	1	1
Eastern Kingbird	1	1
Least Flycatcher	1	1
Mourning Dove	1	1
Northern Pintail	1	1

* state species of concern

ADDITIONAL SPECIES OF CONCERN OBSERVED ON THE RANCH

The Burrowing Owl is a species of short and mixed grass prairies, generally found in association with prairie dogs and other burrowing mammals. As this owl rarely excavates its own burrow, the presence of available nesting sites may limit this species during the breeding season (Haug et al. 1993).

A species principally of the prairie, the Loggerhead Shrike breeds in isolated trees or large shrubs (Yosef 1996). Grasslands with appropriate perching sites (shrubs, low trees, and fences) provide ideal foraging habitat.

BREEDING EVIDENCE

The Montana Bird Distribution database indicates breeding as either confirmed (B), or indirect evidence of breeding (b) was observed, for all species (with the exception of four: American Crow, Franklin's Gull, Red-necked Grebe and Short-eared Owl) for the quarter latilongs* in which the ranch is located (see table

4) (MBD 2005). Direct evidence of breeding was observed for five species previously documented only with indirect evidence of breeding. The Montana Bird Distribution database has been updated to reflect the new breeding status information for the species in the appropriate quarter-latilongs. In addition, another 64 species are reported for the associated quarter latilongs; these include species present across all habitat types, and indicate additional potential species that may occur on the ranch, provided the presence of appropriate habitat (Appendix II). [*Latilong is a combination of the words latitude and longitude and represents the area formed by the intersection of these imaginary mapping lines (Lenard et al. 2003).]

All data collected during the point counts on the Gordon Ranch have been entered into the Montana Natural Heritage Point Observation Database for use in developing Element Occurrences of these prairie species. This information will be available and accessible to all individuals interested in prairie conservation.

Table 4. Documented breeding status in Project Area - Blaine County

Species Common Name	MT Bird Distribution
American Avocet	B
American Crow	t
American Coot	B
American Kestrel	b
American Wigeon	b
Baird's Sparrow	b
Barn Swallow	B
Blue-winged Teal	b
Brewer's Blackbird	B
Brewer's Sparrow	b
Brown-headed Cowbird	b
Burrowing Owl	B
California Gull	b
Chestnut-collared Longspur	b (B)*
Clay-colored Sparrow	b
Cliff Swallow	B
Common Nighthawk	b
Common Tern	b
Eared Grebe	b
Eastern Kingbird	b
Franklin's Gull	t
Gadwall	b
Gray Partridge	b
Horned Lark	b (B)*
Killdeer	b
Lark Bunting	b
Least Flycatcher	b
Loggerhead Shrike	b
Long-billed Curlew	b
Mallard	b
Marbled Godwit	b
McCown's Longspur	B
Mourning Dove	b
Northern Harrier	b
Northern Pintail	b
Northern Shoveler	B
Redhead	b
Red-necked Grebe	t
Red-winged Blackbird	B
Ring-billed Gull	b
Ruddy Duck	b
Savannah Sparrow	b
Sharp-tailed Grouse	b (B)*
Short-eared Owl	t
Sprague's Pipit	b
Swainson's Hawk	B
Vesper Sparrow	b (B)*
Western Meadowlark	b
Willet	b (B)*
Wilson's Phalarope	b
Wilson's Snipe	b
Yellow Warbler	B

* indicates new information on the breeding status of these species based upon information gathered during point count surveys during this project.

CONCLUSION

This report describes the methods used for performing a first-year point count inventory of bird species on select sites on the Gordon Ranch in Blaine County, Montana, and presents data from the 2004 field visit. Several state Species of Concern and/or PIF Priority Species were detected (Table 2), with many additional species that are typical breeding members of grassland communities elsewhere in Montana. Most, if not all, of the species of concern probably breed at or near the locations where they were recorded, as the field survey occurred during the breeding season and observations included singing males, territorial displays in appropriate breeding habitat, and some active nests.

We anticipate that additional bird species breed on the property and will be discovered with additional field investigations; thus, the information presented here should not be considered a comprehensive assessment of the avian diversity across the project area. Additional inventory and monitoring efforts would assist in gaining a better understanding of the importance of this easement to the conservation of the prairie species utilizing this habitat. Further investigations would be warranted when and if management considerations are targeted to particular species of conservation concern. In order to provide breeding opportunities in the future, management efforts on the Gordon Ranch should consider the habitat requirements of each individual species, understanding that optimal conditions for successful breeding can vary greatly between species.

Although Montana's remnant grasslands are critical to the long-term survival of a host of native species, the land continues to be broken for agriculture, fragmented by resource extractive interests, and, for many lands that have survived intact, plagued by poor management. The Gordon Ranch provides breeding habitat for several endemic prairie bird species, as well as other more widespread grassland birds. The conservation easement in place on the ranch is designed to utilize a three-treatment rest-rotation management system to

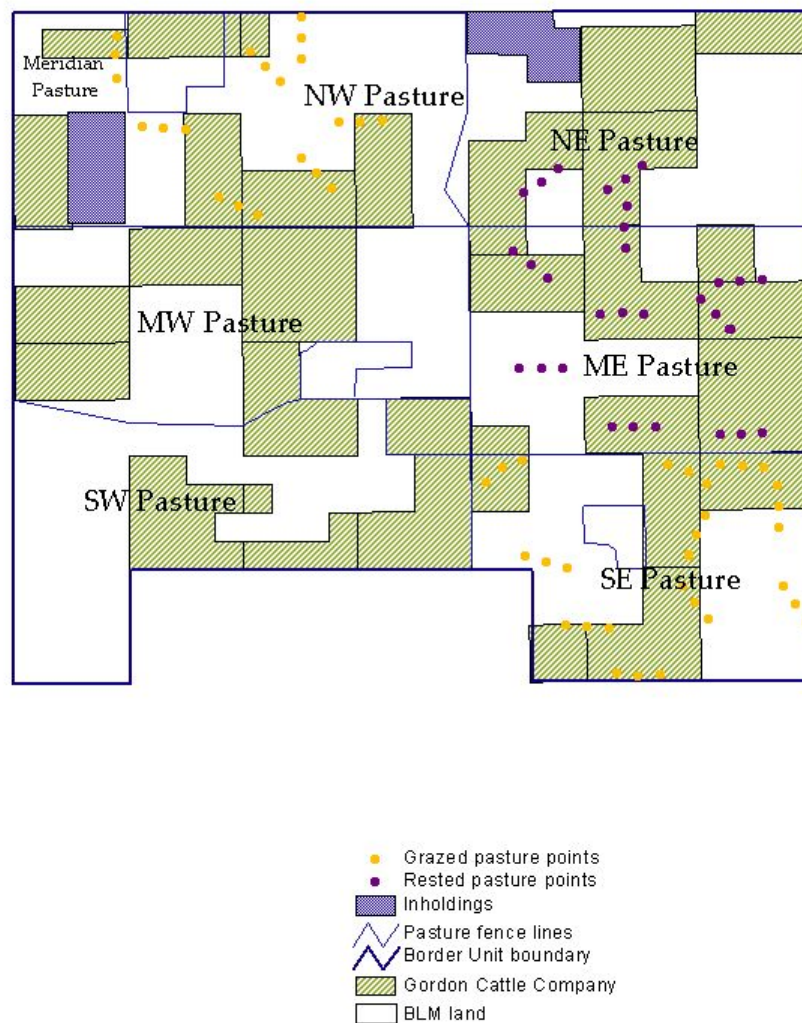
maintain plant diversity on the land for the protection of existing available habitat. Without investigations on surrounding properties, it is difficult to contrast the quality of habitat available on the Gordon Ranch with adjacent ranches. That said, judging from the species diversity discovered on the ranch, the general abundance of individual species, and the presence of comparatively abundant numbers of state species of concern, securing an easement on the Gordon Ranch was a great step toward conserving Montana's ever-diminishing native prairie and the unique suite of species that depend upon it. Conservation of our native plants and wildlife, surely, cannot occur without the protection of the land and the natural processes that support them.

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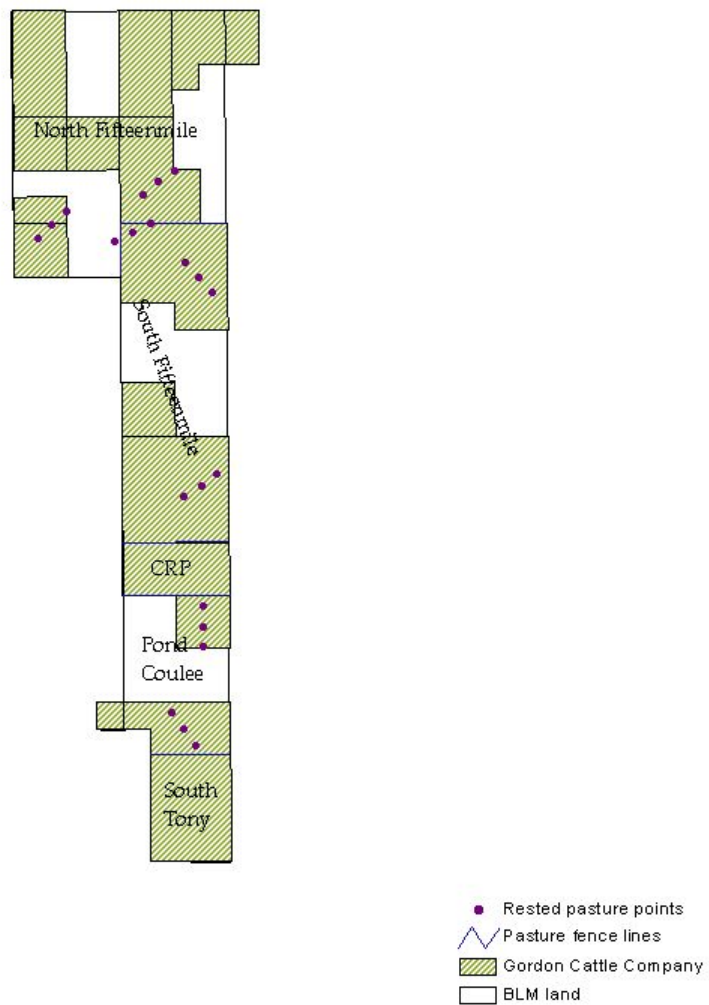
Appendix A. Point Count Locations on Border Unit, Gordon Cattle Company

GORDON CATTLE COMPANY Border Unit



Appendix B. Point Count Locations on Fifteen Mile Unit, Gordon Cattle Company

GORDON CATTLE COMPANY Fifteenmile Unit



SECTION 2

**NELSON'S SHARP-TAILED SPARROW, LECONTE'S SPARROW,
YELLOW RAIL AND SEDGE WREN IN SHERIDAN, ROOSEVELT,
AND DANIELS COUNTY, MONTANA**

**Nelson's Sharp-tailed Sparrow,
LeConte's Sparrow,
Yellow Rail and Sedge Wren
in
Sheridan, Roosevelt, and Daniels
County, Montana**

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INTRODUCTION

Objectives

The purpose of this study was to conduct surveys of four bird species of special concern:

Yellow Rail (*Coturnicops noveboracensis*),
Sedge Wren (*Cistothorus platensis*), Nelson's
Sharp-tailed Sparrow (*Ammodramus nelsoni*),
and LeConte's Sparrow (*Ammodramus leconteii*).

Although all four target species occur in Montana, little is currently known about their breeding biology and distribution in Montana.

Additionally, species of concern found in the 2003 joint MTHP/FWP list were included in our survey with special attention given to Smooth Green Snake (*Opheodrys vernalis*).

Here we will summarize information documented on 1) site descriptions; 2) numbers of singing males; 3) numbers of pairs & territories when possible 4) breeding evidence of target species.

Study Area

We surveyed 62 sites, which were established in three counties (Sheridan, Roosevelt and Daniels) located in northeast Montana. Survey sites were selected based on potential breeding habitat within each county surveyed. This included emergent wetland marshes (freshwater, brackish, & salt) as well as smaller isolated wetlands (i.e. freshwater seeps/fens associated with alkali lakes). Survey totals within each county were as follows: Sheridan-36 sites; Roosevelt-15 sites; Daniels-11 sites. The higher survey total in Sheridan County directly reflects its landscape, which is dominated by glaciated, prairie potholes. This area, known as The Missouri Choteau, cuts across the northeast corner of Sheridan County and extends southward into the northeast third of Roosevelt County. Traveling west and south of this area, the influence of the Missouri Choteau is replaced by ephemeral tributaries on the Big Muddy Creek in western Sheridan County and by the Poplar River and its tributaries in eastern Daniels County into western Roosevelt County. This area is dominated by an abundance of farm and ranch land, with noticeably fewer wetland

habitats suitable for the target species surveyed in this study.

Survey Timing

Initial surveys began on 2 June and ended 3 July. A second survey period to document breeding evidence on target species began on 13 July and ended on 24 July.

In establishing survey sites, locations with which we had the least familiarity were given preference to avoid any bias in our report. Although areas of historical significance were included, these sites were given secondary consideration. Several historic sites were selected based on their close proximity to Westby, MT. These sites were used to monitor timing of nesting activities during our breeding survey period and each site was revisited multiple times.

We conducted our surveys during morning and evening hours when possible although weather delays during the survey period eventually required us to conduct surveys throughout the day. Survey activities were not conducted when winds exceeded 25 mph or during periods of rain.

Survey Methods

Surveys were conducted using the following method: At each site, observations were initiated by observing and listening for approximately five minutes. Following this, we utilized a tape player to broadcast calls of each target species to increase our probability of detection. This was followed again with a shorter period of observing and listening for any response by target species to our taped calls. During this time, any target species heard or observed were documented. We would then move approximately 100-150 m along our survey route before repeating the process. The 100-150 m distance was established to minimize recounting of individual birds that may cross over from one area to the next.

Documentation

Documentation of survey site locations was made using a GARMEN GPSmap 76 Unit supplied by Montana Natural Heritage Program. Using the GPS unit, waypoints were assigned by numeric

identification at the start of each survey. Where nest locations were found, specific names were assigned to these waypoints (see GPS Waypoint STSP NEST). Any specimens collected were also labeled in this manner (see GPS waypoint SMGR SNAKE).

While conducting individual survey points, information was recorded in a small notebook and later recorded using a standardized Wetland Survey Data Sheet supplied by Montana Natural Heritage Program.

Photos and video were taken of a nest site using a digital camera at GPS Waypoint #021 on 22 July (Appendix B, CD-ROM's; STSP Video & STSP Photos).

RESULTS AND DISCUSSION

Analysis

From the above references, a survey table was made to summarize our findings (Fig. #1, Appendix A).

A total of three individual target species were identified during our survey period. They were Nelson's Sharp-tailed Sparrow (*Ammodramus nelsoni*), LeConte's Sparrow (*Ammodramus leconteii*) and Sedge Wren (*Cistothorus platensis*). Additional species of concern in Montana which were identified during the survey period included 15 bird species, 1 frog species, and 1 snake species. They are listed (in descending order of sites identified at) as follows: Baird's Sparrow (*Ammodramus bairdii*), Grasshopper Sparrow (*Ammodramus savannarum*), Sprague's Pipit (*Anthus spragueii*), Black Tern (*Chilidonias niger*), Bobolink (*Dolichonyx oryzivorus*), Chestnut-collared Longspur (*Calcarius ornatus*), American White Pelican (*Pelecanus erythrorhynchos*), Lark Bunting (*Calamospiza melanocorys*), Franklins Gull (*Larus pipixcan*), American Bittern (*Botaurus lentiginosus*), Piping Plover (*Charadrius melodus*), White-faced Ibis (*Plegadis chihi*), Orchard Oriole (*Icterus spurius*), Common Tern (*Sterna hirundo*), Forster's Tern (*Sterna forsteri*), Northern Leopard Frog (*Rana pipiens*) and Smooth Green Snake (*Opheodrys vernalis*).

Nesting Results

Nelson's Sharp-tailed Sparrow was the most abundant target species identified. They were observed at 31 survey sites, and their distribution was throughout the entire survey area (Sheridan County-22 sites, Roosevelt County-5 sites, Daniels County-4 sites). Definitive breeding evidence for Nelson's Sharp-tailed Sparrow was observed at two separate locations in Sheridan County (Fig.#1, Appendix A, GPS Point #001, GPS Point #021). A single case of Brown-headed Cowbird parasitism of a Nelson's Sharp-tailed Sparrow nest was documented on 22 July at McCoy Dam north of Plentywood, MT (Fig. #1, Appendix A, GPS Point #021, Appendix B, CD-ROM, STSP Video, CD-ROM, STSP Photos). Based on circumstantial evidence, it was probable that breeding occurred at three additional survey sites (Fig. #1, Appendix A, GPS Point #023, GPS Point #048, and GPS Point #062).

LeConte's Sparrow was uncommon throughout the survey period. They were observed at a total of 5 survey sites, all located in Sheridan County (Fig. #1, Appendix A, GPS Point #001, GPS Point #008, GPS Point #023, GPS Point #042, and GPS Point #057). Despite numerous visits to these sites, no definitive breeding evidence was observed.

One single observation during our survey period of Sedge Wren was made in Roosevelt County (Fig. #1, Appendix A, GPS Point #038). Based upon observations of territorial behavior and vocalizations by a single male, along with the presence of a female at this site, it is likely these birds nested at this location.

At no time did we identify any Yellow Rail during our survey period.

CONCLUSION

Our goal was to document four species of special concern known to occur in Montana, and to provide information to help us better understand their distribution and breeding biology in the counties surveyed, and the state. Also, we hope this information will help to identify conservation

opportunities that will help maintain these species of concern and aid in developing strategies to conserve the wetland habitats in which they occur.

Although detection rates during our study provided us with information on occurrence and distribution, other results were less conclusive and we believe provide a basis for additional studies.

The weather during our study was dynamic and ever-changing. Spring snow melt combined with above average precipitation in May provided ideal moisture conditions on wetlands we surveyed. Despite these favorable conditions, unseasonably cold temperatures during this same period significantly slowed the emergence of vegetation on these wetlands. A late spring snow storm deposited 16 inches of snow in Sheridan County on the 12th of May. Bitterly cold temperatures and remnants of this storm persisted for over a week

Late arrival dates and inconsistent detection rates during our initial survey period in June on historical sites where LeConte's & Nelson's Sharp-tailed Sparrow were known to occur, along with the complete absence of Yellow Rail and Sedge Wren suggest that weather and vegetation conditions may have played a role.

In an attempt to provide additional information with regard to these inconsistencies, we revisited selected sites where initially target species had not been detected. These sites were revisited multiple times during our breeding survey period in July, and continued to yield additional

observations of Nelson's Sharp-tailed Sparrow and LeConte's Sparrow. Although some of these birds may have avoided detection initially, aggressive vocalizations and territorial behavior observed at these locations may suggest otherwise. Had these birds just arrived at these locations due to adverse weather and vegetation conditions? Or had these birds moved in from another area and were attempting to re-nest or double-brood? Although additional new observations of Nelson's Sharp-tailed Sparrow and LeConte's Sparrow continued during our survey period, this was not the case for Yellow Rail and Sedge Wren. A single observation of Sedge Wren was made during our study, but no Yellow Rail was encountered. Both of these species average arrival dates are somewhat earlier than Nelson's Sharp-tailed and LeConte's Sparrow and may have been more directly affected by weather and vegetation conditions.

Although several instances of breeding evidence were observed during the course of our study, additional studies would be useful in documenting nesting activities. Nelson's Sharp-tailed Sparrow, LeConte's Sparrow and Yellow Rail are highly secretive species. Breeding evidence is difficult to determine as much of the nest building occurs below the vegetation. Field experience with these birds, knowledge of preferred habitats, and luck all play a role in observing and studying these birds in the field.

Additional studies would be helpful in determining the following 1) The effect of climatic and habitat variables 2) Breeding and nesting success rates 3) Density and return rates 4) Brown-headed Cowbird parasitism rates.

Appendix A. Figure #1: Survey Table

GPS Point	Date	Begin Time	End Time	Location Name	County	Target Species Found	Breeding Status	Add'l Species of Concern
001	6/2/04	7:33 AM	9:30 AM	Gaulke Lake-State Line WPA	Sheridan	NSTS-5M,1F;LESP-1M	None	BOBO-1,GRSP-1,SPPI-3M,BAIS-1M
001	6/15/04	10:05 AM	12:00 PM	Gaulke Lake-State Line WPA	Sheridan	NSTS-2M	None	None
001	6/20/04	5:00 PM	6:30 PM	Gaulke Lake-State Line WPA	Sheridan	NSTS-2M,1F	None	SPPI-1,BAIS-2M
001	7/3/04	8:00 AM	9:30 AM	Gaulke Lake-State Line WPA	Sheridan		None	SPPI-1,BAIS-1M
		6:00 PM	7:00 PM	Gaulke Lake-State Line WPA	Sheridan	NSTS-3M,1F	None	None
001	7/13/04	6:20 PM	8:00 PM	Gaulke Lake-State Line WPA	Sheridan	NSTS-2M	None	SPPI-1, BAIS-2M
001	7/19/04	6:15 AM	7:20 AM	Gaulke Lake-State Line WPA	Sheridan	NSTS-3M,1F	Yes-Food carry & fecal sac drop	SPPI-1,GRSP-1
002	6/2/04	10:16 AM	11:07 AM	State Line WPA-Restored Wetland	Sheridan	None	None	BOBO-2M, CCLO-2M,SPPI-1M,
003	6/2/04	12:12 PM	1:17 PM	Widgeon Slough WPA	Sheridan	NSTS-1M	None	BOBO-5M,GRSP-1M,BAIS-2M
003	7/23/04	9:15 AM	10:20 AM	Widgeon Slough WPA	Sheridan	NSTS-2M, 1F	None	BOBO-4M, GRSP-2M,BAIS-1
004	6/2/04	3:42 PM	4:15 PM	Bolster Dam	Sheridan	None	None	BLTE-12, AWPE-4
005	6/2/04	5:22 PM	6:30 PM	Johnson Lake-Valpone Chandler	Sheridan	None	None	GRSP-1,LARB-1,BLTE-2,BAIS-2M
006	6/2/04	6:40 PM	7:30 PM	Salt Lake	Sheridan	None	None	PIPL-1,CCLO-2M,SPPI-1M
006	7/23/04	10:30 AM	11:00 AM	Salt Lake	Sheridan	NSTS-1M	None	CCLO-1M,1F,SPPI-1M,BAIS-1M
007	6/3/04	7:34 AM	8:15 AM	Unnamed Wetland	Sheridan	None	None	BOBO-4,GRSP-3,BAIS-2M
008	6/3/04	8:25 AM	10:35 AM	Big Slough WPA-Dominek Lake	Sheridan	NSTS-2M	None	GRSP-1M,BAIS-2M
008	6/7/04	9:20 PM	10:00 PM	Big Slough WPA-Dominek Lake	Sheridan	None	None	None
008	7/20/04	10:50 AM	12:00 PM	Big Slough WPA-Dominek Lake	Sheridan	NSTS-2M;LESP-1M	None	GRSP-2,BOBO-6M,SPPI-1M,BAIS-2M
008	7/21/04	5:30 AM	6:30 AM	Big Slough WPA-Dominek Lake	Sheridan	NSTS-1M;LESP-1M	None	BOBO-3,SPPI-1M,BAIS-1M
009	6/3/04	3:46 PM	4:40 PM	Section WPA (East drainage)	Sheridan	None	None	GRSP-1,BLTE-4,BOBO-2,SPPI-3M,BAIS-4M
010	6/4/04	7:24 AM	7:47 AM	Unnamed Wetland-Comertown TNC	Sheridan	NSTS-1M	None	GRSP-2,CCLO-5,SPPI-2M,BAIS-2M
010	7/19/04	10:05 AM	11:00 AM	Unnamed Wetland-Comertown TNC	Sheridan	NSTS-1M	None	GRSP-1,SPPI-2M,BAIS-2M
011	6/4/04	8:06 AM	8:38 AM	Lone Tree Lake-Comertown TNC	Sheridan	None	None	PIPL-1,CCLO-2M,BLTE-2,SPPI-3M,BAIS-3M
012	6/4/04	7:30 PM	8:25 PM	Rivers WPA	Sheridan	NSTS-1M	None	BLTE-1000
012	7/20/04	9:45 AM	10:30 AM	Rivers WPA	Sheridan	None	None	BAIS-1M
013	6/5/04	8:00 AM	8:35 AM	Unnamed Wetland-Stadstad Farms	Sheridan	None	None	None
013	7/23/04	12:00 PM	12:45 PM	Unnamed Wetland-Stadstad Farms	Sheridan	NSTS-1M	None	BAIS-1M

GPS Point	Date	Begin Time	End Time	Location Name	County	Target Species Found	Breeding Status	Add'l Species of Concern
014	6/5/04	8:40 AM	9:20 AM	Unnamed Wetland-NE of Outlook, MT	Sheridan	None	None	BLTE-2
015	6/5/04	11:44 AM	12:10 PM	Unnamed Wetland-Daleview, MT	Sheridan	None	None	GRSP-1
016	6/5/04	12:30 PM	1:25 PM	Whitetail Reservoir	Daniels	None	None	BLTE-2,AWPE-2,BAIS-1M
017	6/5/04	2:02 PM	2:32 PM	Jagiello WPA	Daniels	None	None	None
018	6/5/04	3:05 PM	3:45 PM	International Marsh-Scobey, MT	Daniels	NSTS-?	None	BAIS-3M
019	6/5/04	4:45 PM	5:50 PM	Flaxville WPA	Daniels	None	None	BOBO-3,GRSP-1,BAIS-2M
020	6/7/04	7:03 AM	7:45 AM	Gooselake WPA (south)	Sheridan	None	None	GRSP-2,BAIS-3M
021	6/8/04	7:43 AM	9:00 AM	McCoy Dam	Sheridan	NSTS-2M	None	BLTE-2,BAIS-2M
021	6/30/04	10:00 AM	10:45 AM	McCoy Dam	Sheridan	NSTS-1M	None	CCLO-2M,SPPI-1M,BAIS-1M
021	7/19/04	11:30 AM	12:45 AM	McCoy Dam	Sheridan	NSTS-1M,1F	Yes-Food & fecal drop	SPPI-1M
021	7/22/04	10:00 AM	12:00 PM	McCoy Dam	Sheridan	NSTS-1M, 1F	Yes-Food & fecal drop	None
021		1:45 PM	3:00 PM	McCoy Dam	Sheridan	NSTS-1M, 1F	Nest w/fledgling BHCO	None
STSP Nest	7/22/04	1:16 PM	1:16 PM	McCoy Dam	Sheridan	NSTS-1M, 1F	Nest w/fledgling BHCO	None
STSP Nest	7/24/04	2:30 PM	3:20 PM	McCoy Dam	Sheridan	None, NSTS not found	Empty nest, Photo	None
022	6/8/04	10:14 AM	11:00 AM	Ford Creek	Sheridan	None	None	SPPI-3M,BAIS-1M,GRSP-2M,UPSA-2 w/nest?
023	6/9/04	7:40 AM	9:30 AM	Section WPA (west drainage)	Sheridan	NSTS-4M, 1F	None	SPPI-3M,BAIS-6M,BOBO-6M,GRSP-1M
023	7/21/04	6:50 AM	8:00 AM	Section WPA (Wast drainage)	Sheridan	NSTS-2M, 1F; LESP-2M	STSP-food carry?	SPPI-2M,BAIS-2M,AMBI-2,BOBO-2M,GRSP-1M
024	6/9/04	10:24 AM	11:00 AM	Unnamed Wetland-Sand Creek	Roosevelt	None	None	BAIS-1M
024	7/21/04	3:55 PM	4:30 PM	Unnamed Wetland-Sand Creek	Roosevelt	NSTS-1M	None	BAIS-1M,LARB-1M,1F
025	6/9/04	11:10 AM	11:45 AM	Unnamed Wetland-Ronning Farms	Roosevelt	None	None	CCLO-1M,
026	6/9/04	12:05 PM	1:10 PM	Unnamed Wetland-Sand Creek	Roosevelt	NSTS-1M, 1F	None	GRSP-1
027	6/9/04	2:45 PM	3:20 PM	Big Lake-Darnell Sparks	Roosevelt	None	None	BAIS-1M,AWPE-6,CCLO-3M,BLTE-3,BOBO-1M
028	6/14/04	7:53 AM	8:38 AM	Dagmar South WPA-lake #11-#12	Sheridan	NSTS-2M	None	CCLO-2M,BLTE-5,COTE-1,AMBI-1
028	7/21/04	8:10 AM	8:40 AM	Dagmar South WPA-lake #11-#12	Sheridan	None	None	BAIS-1,BLTE-2
029	6/15/04	8:07 AM	9:30 AM	Unnamed wetland-Homestead, MT	Sheridan	NSTS-3m	None	FRGU-3
030	6/16/04	9:45 AM	10:20 AM	Medicine Lake NWR-Homestead	Sheridan	None	None	None
031	6/16/04	6:45 AM	7:10 AM	Reserve Creek	Sheridan	NSTS-1M	None	SPPI-1M,BAIS-1M

GPS Point	Date	Begin Time	End Time	Location Name	County	Target Species Found	Breeding Status	Add'l Species of Concern
031	7/19/04	1:30 PM	2:25 PM	Reserve Creek	Sheridan	NSTS-1M	None	SPPI-1M,BAIS-1M
032	6/16/04	7:45 AM	8:10 AM	Duck Lake	Roosevelt	None	None	FRGU-150,BLTE-20
033	6/16/04	9:20 AM	10:00 AM	Johnson Lake WPA-East	Roosevelt	None	None	BAIS-2M,BOBO-1M,GRSP-1M,BLTE-1
033	7/21/04	11:20 AM	12:45 PM	Johnson Lake WPA-East	Roosevelt	NSTS-1M	None	None
SMG R Sn	7/21/04	11:56 AM	12:10 PM	Johnson Lake WPA-East	Roosevelt		None	Smooth Green Snake
034	6/16/04	10:10 AM	10:55 AM	Johnson Lake WPA-West	Roosevelt	None	None	BAIS-1M
035	6/16/04	11:45 AM	1:00 PM	Manning Slough	Roosevelt	None	None	BAIS-1M,CCLO-2M,WFIB-16,FRGU-200-300
036	6/16/04	1:45 PM	2:10 PM	McIlwain Lake	Roosevelt	None	None	BAIS-3M,GRSP-1M,CCLO-3M
037	6/18/04	8:00 AM	8:35 AM	Unnamed Wetland-E. of Froid, MT	Roosevelt	NSTS-2M	None	BAIS-1M,BLTE-6
037	7/21/04	3:00 PM	3:45 PM	Unnamed Wetland-E. of Froid, MT	Roosevelt	None	None	BAIS-1M
038	6/18/04	9:30 AM	10:30 AM	Unnamed Wetland-Bainville, MT	Roosevelt	NSTS-1M, 1F	None	BOBO-2M,GRSP-1M
038	7/21/04	1:15 PM	2:45 PM	Unnamed Wetland-Bainville, MT	Roosevelt	NSTS-1m, 1F; SEWR-1M, 1F	Yes(?) Behavior	OROR-1M,1F w/nest
039	6/18/04	3:05 PM	3:40 PM	Rock Springs	Sheridan	None	None	SPPI-1M,BAIS-2M
040	6/18/04	4:20 PM	5:15 PM	Unnamed wetland-E. of McCabe, MT	Roosevelt	None	None	BAIS-1M,GRSP-1M
041	6/18/04	6:00 PM	6:50 PM	Unnamed wetland-V. Anderson Dam	Roosevelt	None	None	BAIS-1M,GRSP-2M,FOTE-1,AWPE-4
042	6/20/04	9:30 PM	10:30 PM	Unnamed wetland-Gooselake West	Sheridan	NSTS-2M; LESP-1M	None	SPPI-1M,BAIS-2M,GRSP-1M,BOBO-1M,CCLO-3
042	6/29/04	6:30 AM	6:55 AM	Unnamed wetland-Gooselake West	Sheridan	NSTS-2M, 1F; LESP-2M	None	BAIS-3M,CCLO-2M
042	7/13/04	10:00 AM	11:20 AM	Unnamed wetland-Gooselake West	Sheridan	LESP-1M, 1F?	None	BAIS-1M
042	7/20/04	8:00 AM	9:30 AM	Unnamed wetland-Gooselake West	Sheridan	LESP-2M?	None	BAIS-1M
043	6/21/04	7:00 AM	7:25 AM	Unnamed Wetland-Navaho, MT	Daniels	None	None	BAIS-2M,BLTE-3
044	6/21/04	8:00 AM	8:40 AM	Unnamed Wetland-S. of Flaxville, MT	Daniels	None	None	LARB-2M,BLTE-1
045	6/21/04	8:57am	9:30 AM	Unnamed Wetland-S. of Flaxville, MT	Daniels	NSTS-1?	None	BAIS-1M
046	6/21/04	9:43 AM	10:33 AM	Smoke Creek drainage	Daniels	None	None	BAIS-4M,CCLO-6M,UPSA-1M,1F
047	6/21/04	11:00 AM	11:10 AM	Smoke Creek drainage	Daniels	None	None	BAIS-1M,BOBO-1M
048	6/21/04	11:30 AM	12:45 PM	Smoke Creek-Pleasant Prairie	Daniels	NSTS-3M	None	GRSP-1M,UPSA-2
048	7/23/04	3:00 PM	4:30 PM	Smoke Creek-Pleasant Prairie	Daniels	NSTS-1M,1F	Yes - Food carry?	SPPI-2M,BAIS-2M,UPSA-1
049	6/1/04	12:15 PM	1:30 PM	Northeast WPA	Sheridan	None	None	SPPI-2M,BAIS-1M
049	6/22/04	11:45 AM	12:30 PM	Northeast WPA	Sheridan	NSTS-2M	None	SPPI-1M,BAIS-2M,BOBO-2M,CCLO-3M,1F
049	7/13/04	8:16 AM	9:40 AM	Northeast WPA	Sheridan	NSTS-1M, 1F	None	SPPI-1M,BAIS-1M

GPS Point	Date	Begin Time	End Time	Location Name	County	Target Species Found	Breeding Status	Add'l Species of Concern
050	6/22/04	12:50 PM	2:00 PM	Base Camp WPA	Sheridan	NSTS-2M	None	GRSP-1M
050	6/24/04	10:30 PM	12:00 AM	Base Camp WPA	Sheridan	NSTS-1M	None	None
050	7/19/04	7:40 AM	8:50 AM	Base Camp WPA	Sheridan	NSTS-3M	None	SPPI-1M
051	6/25/04	10:26 AM	11:15 AM	Unnamed wetland-Four Buttes, MT	Daniels	None	None	BLTE-2
052	6/28/04	8:30 AM	9:15 AM	Unnamed wetland-Comertown, MT	Sheridan	None	None	SPPI-2M,BAIS-3M,GRSP-1M
053	6/28/04	9:35 AM	10:10 AM	Comers Lake	Sheridan	NSTS-2M, 1F	None	GRSP-2M,BOBO-4M
053	7/19/04	11:10 AM	11:20 AM	Comers Lake	Sheridan	None	None	None
054	6/28/04	10:30 AM	11:10 AM	Unnamed wetland-Dooley, MT	Sheridan	None	None	SPPI-2M,BAIS-2M,BLTE-23 w/nest
055	6/29/04	7:30 AM	8:05 AM	Unnamed wetland-coalridge, MT	Sheridan	None	None	BLTE-35-40,FRGU-10
056	6/29/04	8:15 AM	9:00 AM	Unnamed wetland-Antelope, MT	Sheridan	NSTS-1M	None	BLTE-2
056	7/19/04	2:45 PM	3:30 PM	Unnamed wetland-Antelope, MT	Sheridan	None	None	None
057	6/29/04	9:30 AM	10:20 AM	Lake Creek Flats-Med. Lake NWR	Sheridan	NSTS-4M	None	GRSP-2M
057	7/21/04	8:50 AM	10:30 AM	Lake Creek Flats-Med. Lake NWR	Sheridan	NSTS-8M, 2F; LESP-2M	None	AWPE-3,LARB-3M,1F
058	6/30/04	7:15 AM	7:35 AM	Unnamed wetland-Plentywood, MT	Sheridan	NSTS-1M	None	None
059	6/30/04	8:00 AM	9:05 AM	Raymond Dam-Raymond, MT	Sheridan	None	None	BAIS-1M,BLTE-1
060	7/23/04	8:30 AM	9:00 AM	Unnamed wetland	Sheridan	NSTS-1M	None	SPPI-1M,CCLO-1M
061	7/23/04	10:30 AM	11:00 AM	Unnamed wetland-W. of Salt Lake	Sheridan	NSTS-2M	None	SPPI-1M,BAIS-2M,BOBO-1M
062	7/23/04	1:15 PM	2:30 PM	Whitetail Creek - E. of Whitetail, MT	Daniels	NSTS-2M,1F	Yes - Food carry?	Leopard Frog, BLTE-1

SECTION 3

RESULTS OF AN AERIAL SURVEY FOR BLACK-TAILED AND WHITE-TAILED PRAIRIE DOG COLONIES IN SOUTHEASTERN MONTANA

**RESULTS OF AN AERIAL SURVEY FOR
BLACK-TAILED AND WHITE-TAILED
PRAIRIE DOG COLONIES
IN SOUTHEASTERN MONTANA**

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ABSTRACT

An aerial survey for black-tailed and white-tailed prairie dogs (*Cynomys ludovicianus*, *C. leucurus*) was conducted in southeastern Montana during 2004. A few blocks of Federal land and 2 Indian Reservations with recent prairie dog mapping data were not included in the survey. Areas with black-tailed prairie dogs were searched by flying parallel transect lines on odd numbered minutes of latitude. Southern Carbon County was searched for white-tailed prairie dogs by flying to known colonies and then searching similar adjacent habitat. Approximately 135 hours of aerial survey effort was expended to cover the survey areas. A total of 1,790 black-tailed prairie dog colonies was found. About 45% of the black-tailed prairie dog colonies were estimated to be less than 10 acres in size while less than 2% of the colonies were larger than an estimated 320 acres. Prairie dog colonies were not evenly distributed across the survey area, but instead, complexes of colonies were grouped in distinct geographic areas. Seven new white-tailed prairie dog colonies were found during the survey, but ground based observations will be required to verify that these colonies are active.

INTRODUCTION

The status of black-tailed and white-tailed prairie dogs in Montana has been a concern since the appearance of sylvatic plague starting in the mid-1980s (FaunaWest 1999). A survey for black-tailed prairie dogs at that time suggested there were over 100,000 acres of prairie dog occupied lands and more than 700 known colonies (average colony size 143 acres) (Campbell 1989). A survey in the late 1990s found a minimum of 66,000 acres and 1,450 colonies (FaunaWest 1999). A major problem encountered in this latter survey was obtaining permission to map prairie dog colonies on private land, and obtaining permission to cross private land to map prairie dog colonies on public land. Approximately half of the landowners did not permit access to their land or to cross their land. Prairie dogs were generally viewed by private landowners as a range resource problem, and they did not want government conservation

agencies knowing what was on their land and how they chose to manage prairie dogs. The attempt by conservation groups to have the black-tailed prairie dog listed as a Federally protected threatened species further exasperated the access problem. Aerial surveys represent a simple solution to the access issue because they provide a means to inventory wildlife without infringing upon private property rights, and they make all land equally accessible.

Aerial surveys for prairie dog colonies have 3 distinct advantages over ground based surveys. These advantages are: 1) increased visibility of the landscape, 2) access issues are resolved, and 3) large areas can be surveyed in a relatively short period. A major disadvantage of aerial surveys for prairie dog colonies is that it is difficult to estimate the area occupied by prairie dogs as compared to ground based mapping with GPS. This problem can be partially resolved by follow-up ground based mapping of prairie dog colonies for which there is legal public access, or where landowners are willing to cooperate with prairie dog inventories. Through ground based mapping, a mean and standard deviation of prairie dog colony size can be developed to help interpret colony size estimates made during aerial surveys. In 2004, an aerial survey of southeastern Montana was conducted to develop a comprehensive distributional map for black-tailed and white-tailed prairie dogs. This report describes the methods used to conduct the aerial survey and summarizes the results of the survey

METHODS

The purpose of this aerial survey was to locate black-tailed and white-tailed prairie dog colonies in southeastern Montana, and to provide a map of colony locations that would represent a relatively complete inventory of active colonies. The study area consisted of 3 distinct survey areas (Figure 1). The primary survey area extended from the Montana/Wyoming state line north to the Charles M. National Wildlife Refuge (CMR) /Missouri River, and from the Montana/North Dakota and South Dakota state lines west to the line formed by Highways 87, 19, and 191. However, the primary survey area was

modified as follows. Areas with recent and relatively complete prairie dog colony mapping were not surveyed. This included the Ashland Ranger District, the Crow and Northern Cheyenne Reservations, Powder River County, southeastern Bighorn County and that portion of the CMR south of the Missouri River/Fort Peck Reservoir. In addition, previous prairie dog surveys had found very few colonies in Dawson, McCone, Richland and Wibaux Counties and much of this area was not surveyed in order to focus the survey effort on other areas known to contain significant prairie dog populations outside the primary survey area. However, within this area, terraces of the Yellowstone River between Glendive and Sidney were surveyed from the air. Another area within the primary survey area that was not surveyed was an area within a 15 mile radius of the Billings Airport that was designated by the Federal Aviation Administration as controlled air space. The secondary black-tailed prairie dog survey area included land southwest and northwest of Roundup in Yellowstone, Wheatland, Golden Valley Stillwater, and Musselshell Counties. This area was added to the survey effort as time permitted because previous ground based prairie dog mapping efforts suggested that this area contained numerous prairie dog colonies.

White-tailed prairie dogs occur in Montana with limited distribution in southern Carbon County. At the time of this survey, only 6 known white-tailed prairie dog colonies were documented in southern Carbon County. This was less than half the number of the white-tailed prairie dog colonies found during an inventory of Carbon County in the late 1970s (Flath 1979). My survey for white-tailed prairie dog colonies was in those areas of southern Carbon County where there had been previous documentation of white-tailed prairie dogs. The primary and secondary black-tailed prairie dog survey areas and the white-tailed prairie dog survey area are shown in Figure 1.

A Cessna 180 was used to fly east-west oriented transect lines within the primary black-tailed prairie dog survey area. The transect lines were flown on odd numbered minutes of latitude starting at 45° 01' N (1 mile north of the

Montana/Wyoming state line), and proceeding north up to 47° 49' N, but not going north of the CMR. Transect lines on odd numbered minutes of latitude were approximately 2 miles apart. A dash-mounted Garmin GPS IV was used to keep the plane on the transect lines and to identify ends of the transect line. The plane was flown 150-300 feet above ground level and cruised at about 135 mph. The pilot and 1 observer each viewed forward and out their respective sides for prairie dog colonies. When a prairie dog colony was spotted the plane was circled over the colony, and a latitude/longitude coordinate waypoint was recorded with a Garmin 12XL GPS unit. For each colony, an estimate of colony size (acres) was recorded. These were gross estimates and generally were recorded as follows: 1, 5, 10, 20, 30, 40, 60, 80, 100, 120, 160, 240, 320, 480, 640, and 1,000 acres. These estimates were made in order to establish the relative abundance of various prairie dog colony size classes, and not to provide an accurate accounting of total prairie dog acreage. Other information recorded for prairie dog colonies included topographic setting and livestock point attractants. Prairie dog colonies were determined to be active if there was a definite vegetation difference that demarcated the colony and/or open burrows were observed at prairie dog mounds. If there was a question about the activity status of a colony, it was noted as possibly being inactive.

In the secondary black-tailed prairie dog survey area, the western boundary of the survey area was established by conducting a cursory aerial survey in eastern Sweetgrass and Wheatland Counties, and northern Stillwater County to determine the western limits of the prairie dog complex in this area. The actual survey then proceeded as east-west oriented transect lines spaced at odd minutes of latitude within the area that was determined to contain prairie dog colonies. The eastern boundary of the secondary survey area was Highway 87. The survey proceeded from the east end of the Little Snowy Mountains/Flat Willow Creek south to the Molt/Big Lake area. The data recorded were identical to that described for the primary survey area.

Within the white-tailed prairie dog survey area, the survey consisted of flying to previously documented colonies and searching the surrounding area for evidence of other colonies. White-tailed prairie dog colonies proved to be more difficult to spot from the air because the colonies were smaller, had lower burrow densities, and there were frequently no obvious vegetation differences between inside and outside of the colony. Activity status at white-tailed prairie dog colonies was based on open burrows.

RESULTS AND DISCUSSION

Black-Tailed Prairie Dogs

This survey was conducted during March, April and September 2004. Approximately 135 hours of aerial survey time was expended to systematically search the 3 survey areas. A total of 1,790 black-tailed prairie dog colonies was found during the aerial survey. This is a minimum count, since it was obvious during the survey that smaller prairie dog colonies could be easily missed with a transect line spacing of about 2 miles. Flath (1978) commented about missing a 90-acre colony when conducting an aerial survey for prairie dog colonies using transect line spacing of 1 mile in portions of Fallon and Carter Counties. An estimate of the percentage of colonies missed could be made by re-surveying a specific area using a transect line spacing of 1 mile or less.

In addition to the distance factor contributing to missed colonies, prairie dog colonies in some areas such as silty overflow sites were very difficult to observe from the air. Prairie dog colonies may be more observable during summer than spring or fall, but the timing of this aerial survey was based on availability of the plane and pilot. The pilot, Brian Schwend (pers. commun.) reported that prairie dog colonies are very visible from the air during winter when there is a light snow fall followed by a few days of clear skies to melt the snow off of prairie dog mounds. However, such conditions may be ephemeral and local, and not suitable for a large scale aerial survey. Harvester ant mounds in some areas were sufficiently abundant to require close passes to verify that they were not prairie dog mounds.

This survey of southeastern Montana found considerably more prairie dog colonies than the state-wide prairie dog survey in the late 1990s (1,450 prairie dog colonies, FaunaWest 1999). However, the 1990s survey was not considered a complete inventory, but was designed to resurvey of colonies found during the 1980s survey. The 1980s survey only found about 700 colonies in Montana east of 110° West Longitude (Campbell 1989). Based on this current survey and a current accounting of prairie dogs colonies on blocks of Federal land and Indian Reservations not covered in this survey, there could be close to 3,000 prairie dog colonies in Montana. Although there are obvious problems with comparing previous prairie dog surveys with the current survey results because of differences in methods and survey areas, it does appear that prairie dog colonies in Montana are at least as abundant as during previous surveys, or possibly more abundant.

The estimated size (acres) of individual black-tailed prairie dog colonies was recorded for 1,783 of the colonies, and these estimates when totaled equaled 89,863 acres. The estimated average colony size for these 1,783 colonies was 50.4 acres. This is similar to the average colony size (49 acres) for prairie dog colonies mapped in the late 1990s (FaunaWest 1999), but considerably less than the average size (142 acres) for the mid-1980s prairie dog survey (Campbell 1989). This would suggest that the total acreage figure for the current survey is probably a realistic estimate. However, my acreage estimates were based on a visual estimate of size and should not be considered a precise accounting of prairie dog occupied acres in southeastern Montana. Based on my experience of viewing a large number of various sized colonies from the air, it seemed that the size of smaller colonies (less than 20 acre) could be estimated relatively easily, but as colony size increased it became increasingly difficult to view the entire colony at once, and that the estimation error probably increased proportionately with the size of the colony. Consequently, my size estimation strategy for larger colonies was to place the colonies in broad size classes (for example: smaller than a section but larger than a half section = 480 acres).

Despite the inherent problems of estimating prairie dog colony sizes, the estimated colony sizes can be grouped into size classes to provide a distributional analysis of colony sizes. About 45% of the black-tailed colonies were estimated to be 10 acres or less (Figure 2), while only 1% (22 colonies) were estimated to be between 321-640 acres, and only 2 colonies appeared to be 1,000 acres or larger. This prairie dog colony size class distribution seems to be typical for many areas where prairie dogs occur in a variety of geographic settings and under multiple land ownership. Sizes of prairie dog colonies can be influenced by topography, vegetation, control efforts, and plague. This prairie dog colony size class distribution found in this survey suggests that there were many small and probably relatively new colonies in the survey area, but very few large and old colonies. This was especially true in the Tongue River drainage system where prairie dogs were recovering from a plague epizootic. My pilot Brian Schwend (pers. commun.), who had aerial survey experience with much of the survey area since the mid-1970s, stated that there were more and larger prairie dog colonies in the Tongue River area prior to the plague epizootic in the late 1980s and early 1990s, but that the prairie dogs have been increasing in recent years both in number and size of colonies. While mapping prairie dog colonies in Powder River County in 2003, I received similar comments from ranchers that prairie dog colonies had increased substantially in size and numbers since 1996.

Prairie dogs were not distributed evenly throughout the survey areas, but were instead concentrated in specific areas (Figure 3). By far the greatest concentration of prairie dog colonies was along the Tongue River and its tributary drainage. Pumpkin Creek, a major tributary of the Tongue River, seemed to support a large number of prairie dog colonies. Another major concentration of prairie dog colonies was north of the Yellowstone River between Miles City and Terry in Sand Creek and Custer Creek. Other significant prairie dog complexes were found in northern Musselshell County/southern Petroleum County, northern Stillwater County/northwestern Yellowstone County, and northeastern Garfield County. Prairie dog colonies were found

throughout most of the lower portion of the Powder River drainage, but at a considerably lower density than the adjacent Tongue River area. Another area of interest is western Rosebud County/northern Treasure County. While the density of prairie dog colonies in this area may not be as great as the Tongue River area, the number of colonies found was much greater than previous mapping efforts had found, and this area is known to support mountain plovers both on and off of prairie dog colonies.

In some areas, such as Carter County, prairie dogs occurred primarily as scattered isolated colonies. The Campbell (1989) survey showed considerably more prairie dog colonies in northern Carter County in the mid-1980s suggesting that prairie dogs had been substantially reduced. A complex of prairie dog colonies northeast of Ekalaka once contained a single colony estimated to occupy over 1,500 acres (Flath 1978), and was the site of Montana's last known wild black-footed ferret population. In 2004, this complex of colonies was found to be reduced to a cluster of 9 small colonies. In some areas, such as parts of Fallon County, prairie dogs were virtually absent. In this area, Brian Schwend (pers. commun.) showed me one drainage where he knew prairie dogs formerly existed, but we were unable to find any active colonies. In these areas where prairie dogs had been eliminated, it appeared that suitable prairie dog habitat was restricted to valley bottoms, and that under such confined situations prairie dogs may have been eliminated through a combination of poisoning and agricultural development. Upland sites in these areas were characterized by rolling hills dominated by grasses, and because prairie dogs were virtually absent from this habitat, it is assumed that this upland habitat in extreme eastern Montana was only marginally suitable for prairie dogs.

Over half (54%) of the prairie dog colonies were found in valley bottom lands and terraces of major drainage. About 39% of the prairie dog colonies were located in upland rolling prairie, and 7% were found on level well defined ridge tops. Reservoirs were found at 14% of the colonies, and windmills and wells were found at 8% of the colonies. About 7% of the colonies

were located on or next to agricultural land. Ranch headquarters, old homesteads, livestock feeding sites and corrals were found on or next to about 5% of the prairie dog colonies. Cattle and pronghorn were each observed in about 2% of the prairie dog colonies. A sage grouse lek was found in 1 colony, but generally we were flying too high to consistently observe smaller wildlife species.

White-Tailed Prairie Dogs

White-tailed prairie dogs in comparison to black-tailed prairie dogs live at a lower density within their colonies, and consequently their colonies are not as obvious because of dispersed mounds and lesser impact on the vegetation (Tileston and Lechleitner 1966). In Montana, all known white-tailed prairie dog colonies are small. Mapping of 6 known white-tailed prairie dog colonies in 2003 resulted in only a total of 119 occupied acres and an average colony size of about 20 acres. Based on the small colony size, dispersed mounds, and minimal vegetation impacts, it was assumed that white-tailed prairie dogs would be difficult to detect from the air. Consequently, the aerial survey for white-tailed prairie dogs involved flying to each of the 6 known colonies and observing their appearance from the air and then searching similar habitat in the surrounding area. Problems with the aerial survey technique were noted at most of the known colonies. 1) Generally, only a few mounds in a colony were clearly visible from the air, 2) because of the surrounding mountainous terrain, it was difficult to fly low enough to verify open burrows at the mounds, 3) harvester ants were abundant in most of the white-tailed prairie dog habitat and their mounds were easily confused with prairie dog mounds, and 4) there were virtually no vegetation differences that could be seen from the air to aid in detecting colonies. These problems meant that the only way to find a small colony would be to fly directly over the colony at low altitude.

Despite these difficulties, I was reasonably certain of having found 7 new white-tailed prairie dog colonies. Figure 4 shows the location of 7 new suspected prairie dog colonies and the location of 6 known active colonies. The new colonies were named for an adjacent geographic feature and they are as follows: 1) Bowler Flat, 2)

Gyp Spring, 3) Cottonwood Creek, 4) Silver Tip Ridge, and the 5-7) Washoe complex. The Bowler Flat colony was located at the west end of a large wheat field and just north of an abandoned farm house. This appeared to be an agriculturally disturbed site. Several active burrows were observed. We specifically surveyed this site based on a report given to the Bureau of Land Management by a long-term resident of this area (Jay Parks, BLM Biologist, pers. commun.). The Gyp Spring colony contained a few active burrows almost on the Montana/Wyoming state line. A similar small colony appeared to be located nearby in Wyoming. These colonies were located in undisturbed native sagebrush habitat. The Cottonwood Creek colony was located on a large flat west of Cottonwood Creek, and appeared to be a very active colony with many open burrows. This site had scattered shrubs but may have been previously cleared of shrubs. The Silver Tip Ridge colony was situated between an irrigation ditch and Silver Tip Ridge, and appeared to contain only a few active burrows. A portion of the site was disturbed by construction of the irrigation ditch. The Washoe complex appeared to be a series of 3 very active colonies in mountain foothill grassland habitat. One colony was located on a drainage terrace next to a stock water site. This was the only white-tailed colony where vegetation differences between inside and outside of the colony clearly demarcated the colony boundary. From the air, this colony visually appeared to be similar to the appearance of a black-tailed prairie dog colony. The other 2 colonies were located on relatively steep grassy hillsides similar to the Robertson Draw colony.

In addition to these colonies, there were several other sites where we observed mounds and open burrows that could have been prairie dog colonies, but these also could have been ant mounds or badger burrows. All these sites including the 7 sites that are most likely to be colonies need to be checked on the ground during a period of the year when the prairie dogs are active. Until these sites are verified on the ground, it is inappropriate to draw conclusions about these possible prairie dog colonies.

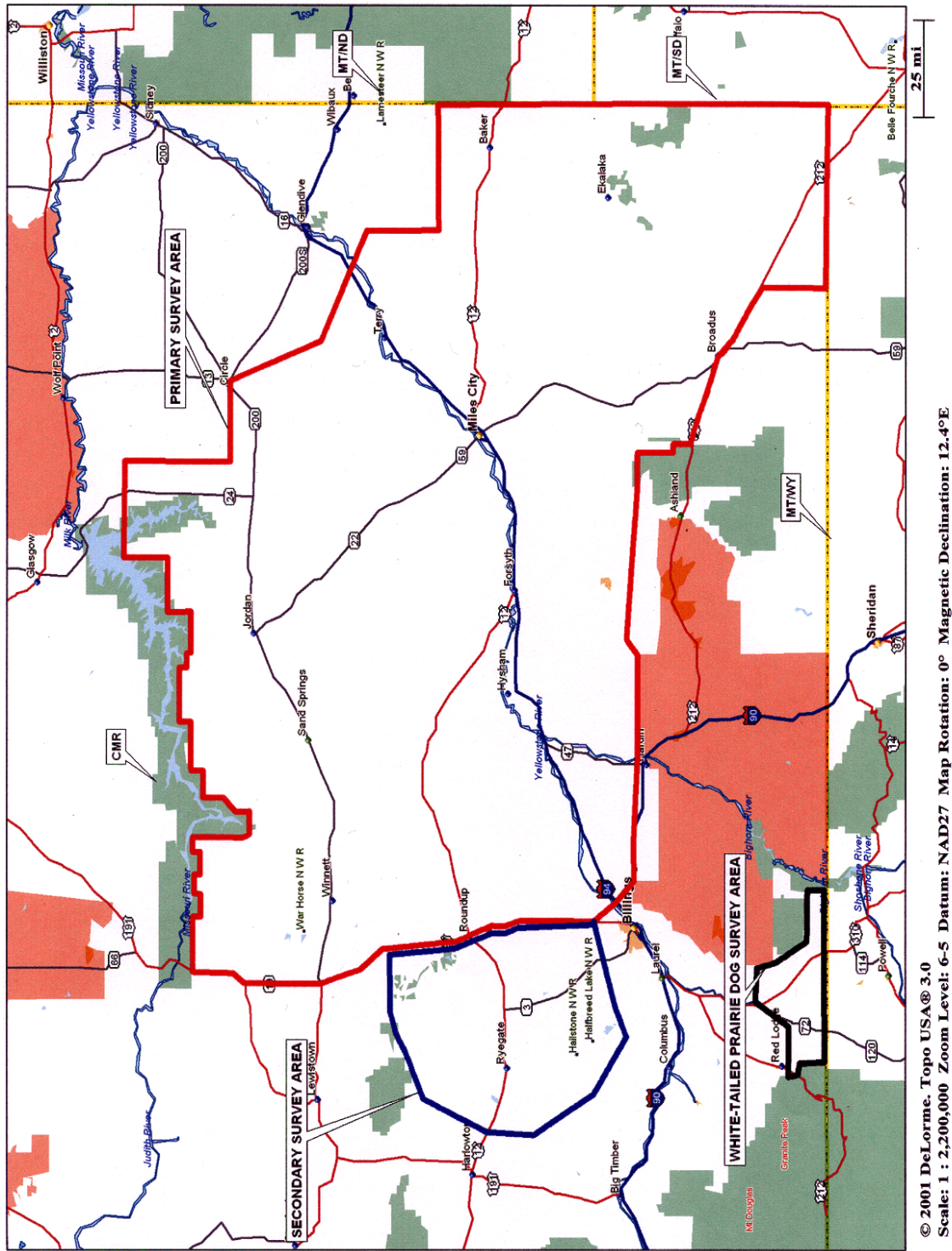


Figure 1. Map of southeastern Montana showing the primary and secondary black-tailed prairie dog survey areas, and the white-tailed prairie dog survey area.

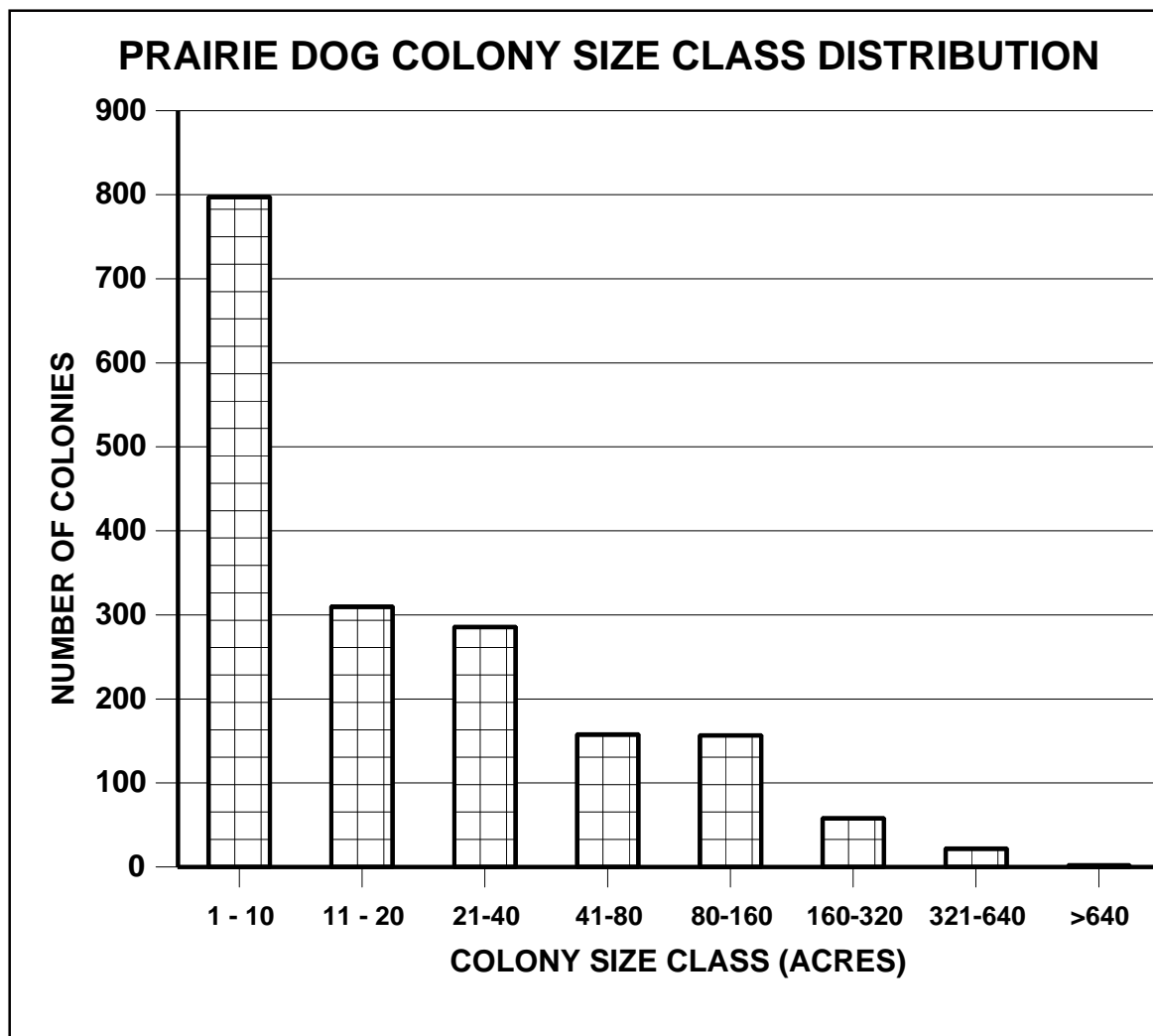


Figure 2. Distribution of prairie dog colony size class for 1,783 black-tailed prairie dog colonies found during an aerial survey of eastern Montana in 2004.

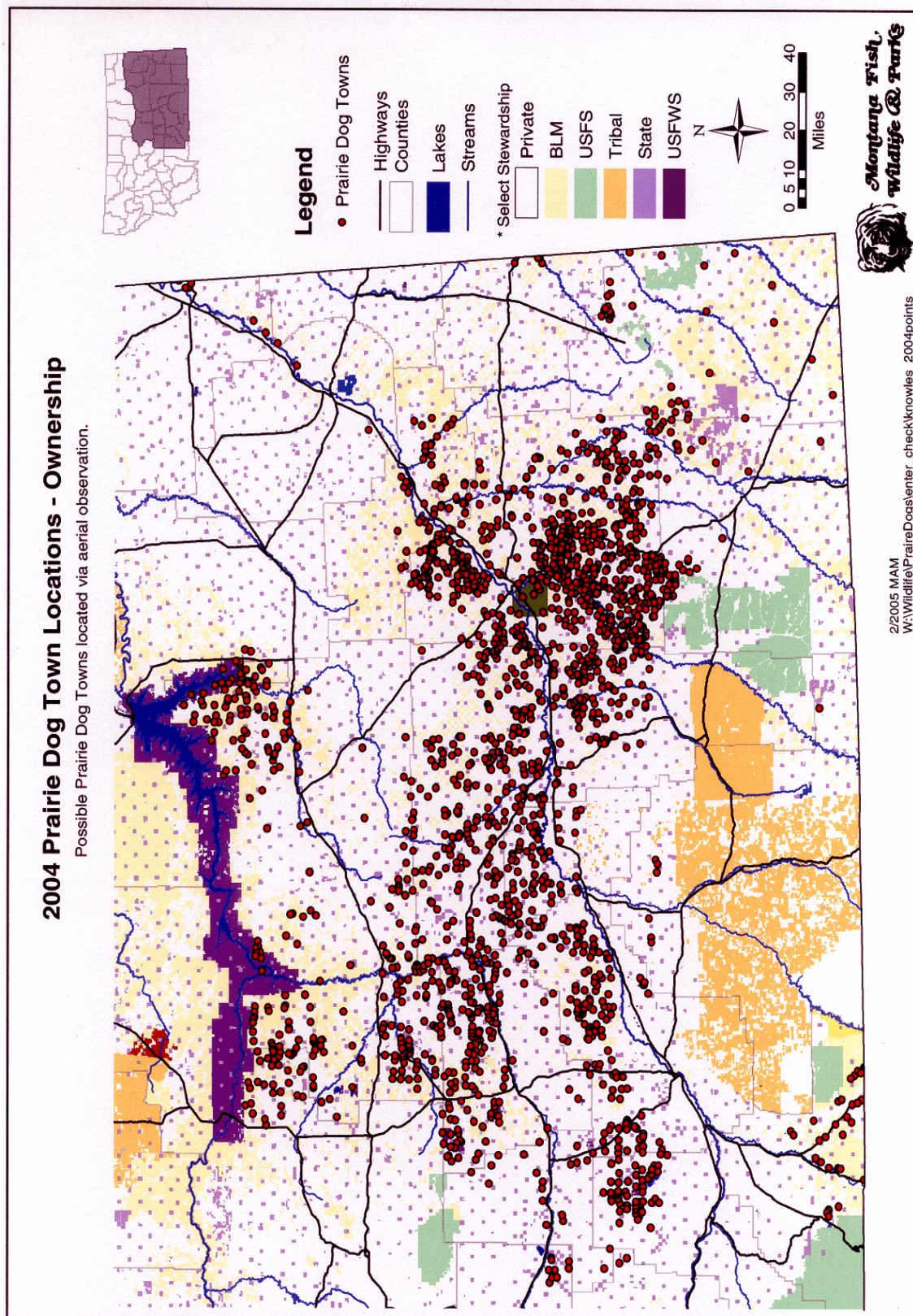


Figure 3. Map of southeastern Montana showing the location of black-tailed and white-tailed prairie dog colonies found during the aerial survey. White-tailed prairie dog

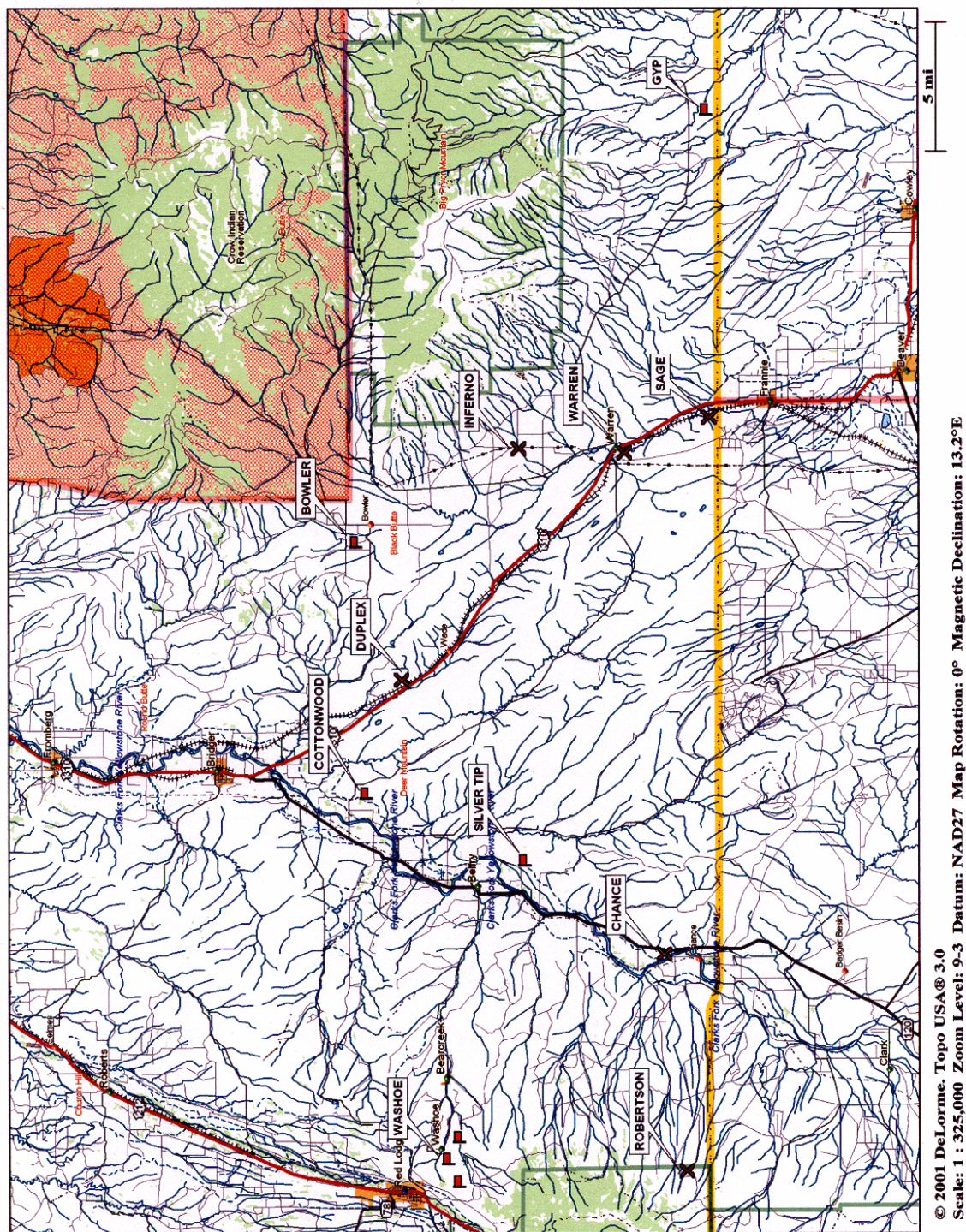


Figure 4. Map of southern Carbon County showing the location of confirmed white-tailed prairie dog colonies (X's) and suspected white-tailed prairie dog colonies (flags).

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SECTION 4

MONTANA SMALL MAMMAL SURVEYS IN SAGEBRUSH HABITATS

MONTANA SMALL MAMMAL SURVEYS
IN SAGEBRUSH HABITATS: 2003 AND 2004

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INTRODUCTION

Sagebrush habitats have drawn substantial attention during the past decade as they have become increasingly sparse, degraded, and fragmented. It is estimated that 50-60% of native sagebrush steppe in North America has either been converted to exotic annual grassland or has exotic annual grasses in its understory (West 2000). This loss of habitat may be detrimental to species associated with sagebrush. Some sagebrush-associated species have been listed or petitioned for listing under the Endangered Species Act as a result of this habitat loss (e.g. sage-grouse, *Centrocercus* spp.; the Columbia Basin population of pygmy rabbits, *Brachylagus idahoensis*). Sagebrush associated birds have received the greatest amount of attention, but more poorly known species may deserve similar concern. Minimal attention has been given to small mammals associated with sagebrush habitats, and therefore little is known of the effect of sagebrush habitat loss on these taxa.

Four species of small mammals associated with sagebrush habitats in Montana currently appear on the Montana Natural Heritage Program's Species of Concern list: *Sorex preblei*, *Sorex nanus*, *Sorex merriami*, and *Perognathus parvus*. Few specimens of these species have been collected in Montana. However, little effort has been made to study these species in the state and the concern over their status may be due simply to a lack of information. This project is intended to provide information on the distribution of these and other sagebrush associated small mammals in the state of Montana.

The objectives of this project as outlined by Carlson (2002) are as follows:

- 1) Document the distribution of sagebrush associated small animals in sage habitats throughout Montana.
- 2) Better define the range and status of these species in Montana.
- 3) Relate sage associated small mammal distribution and relative abundance to vegetation structure and dominant plant species.

- 4) Establish a network of point count sampling stations for monitoring of sage associated small animals and gather baseline data.

METHODS

I conducted small mammal surveys in sagebrush-dominated habitats in Beaverhead, Carbon, Custer, Garfield, Petroleum, Powder River, Powell, Prairie, and Valley counties (Appendices 1 and 2) from June through October of 2003 and 2004. The Montana Natural Heritage Program Zoologist selected regions of the state to be surveyed prior to the field season. In 2003, I selected ten sites within those regions, using relatively dense sagebrush and accessibility (i.e. proximity to road, public land) as primary criteria. Five of those sites were visited once and five were visited twice. In 2004, nine sites were visited once and five sites were visited twice. I ran 4 traplines during each visit for 3 consecutive nights. Traplines were composed of 10 stations spaced 10 m apart in a linear fashion. One Sherman live trap and one museum special snap trap were placed at each station along with an orange flag marking the station. Snap traps were baited with peanut butter. Live traps were baited with a mixture of oats and a commercial birdseed mix (composed primarily of millet, milo, and sunflower seed). A small piece of synthetic insulation was placed in each live trap for bedding. At sites that were visited twice, I also set 2 pitfall arrays during the initial visit and removed them at the end of the final visit. Additionally, in 2004 I set pitfall arrays at 4 of the sites that I visited only once. At those sites, I removed the pitfall arrays approximately 3-4 weeks after setting them. Pitfall arrays consisted of one cylindrical can, measuring 15.5 cm in diameter and 16 cm in depth, at the hub of 3 masonite fences positioned approximately 120 degrees apart. At the distal end of each fence was one plastic cup measuring 9 cm in diameter and 13 cm in depth. The can and cups were placed in holes such that they did not protrude above the ground. The can and cups were filled one-third to one-half full with antifreeze. Snap traps and live traps were set in the evening and checked and closed in the morning after sunrise.

I identified and measured all captured animals before releasing or disposing of them. Animals

captured live were marked on the venter with a black permanent marker in order to prevent double counting. Measurements recorded were: total length (tip of nose to end of vertebral column in tail), tail length (base of tail to end of vertebral column), hindfoot length (heel to end of longest claw), and mass (see Foresman 2001a). Measurements were rounded to the nearest millimeter or gram. I tentatively identified *Sorex* species for this report, but all *Sorex* specimens will be submitted to the Montana Natural Heritage Program Zoologist for verification. Sagebrush vegetation at each site was measured along the length of each of the 4 traplines (Appendix 6). Along each trapline, I measured the intercept length of each sagebrush plant and the maximum height of each of those plants. The total sagebrush-intercept length along each trapline was divided by the length of the trapline (100 m) to arrive at a measure of sagebrush density.

RESULTS

In 2003, 302 small mammals comprising 8 species were captured during 3600 bait trap-nights (i.e. Sherman live-traps and museum special snap traps) and 230 pitfall trap-nights (Appendix 4). 292 (96.69%) of the 302 small mammals captured were *Peromyscus maniculatus*. No other species accounted for more than 1% of total captures: *Tamias minimus*, 0.66%; *Perognathus fasciatus*, 0.66%; *Microtus montanus*, 0.33%; *Microtus pennsylvanicus*, 0.33%; *Sorex merriami*, 0.33%; *Sorex monticolus*, 0.66%; *Lemmyscus curtatus*, 0.33% (Appendix 4).

In 2004, 675 small mammals comprising 8 species were captured during 4560 bait trap-nights (i.e. Sherman live-traps and museum special snap traps) and 444 pitfall trap-nights (Appendix 3). 636 (94.22%) of the 675 small mammals captured were *Peromyscus maniculatus*. *Tamias minimus* and *Dipodomys ordii* each represented over 2% of total captures (2.07% and 2.52% respectively). No other species accounted for more than 1% of total captures: *Perognathus fasciatus*, 0.15%; *Microtus montanus*, 0.59%; *Sorex merriami*, 0.15% (actually 2 specimens, not an UNIDS

Sorex.30%); Unidentified *Sorex* sp., 0.15%; *Lemmyscus curtatus*, 0.15% (Appendix 3).

At one site (Powder River site, Custer county) in 2003 both pitfall arrays were disturbed prior to my second site visit. Only two of the eight pits remained intact and there were no small mammal captures in those. It is unclear whether that was the result of wildlife/livestock interference or human tampering, but the type of disturbance suggested that it was not merely the result of passive interference such as wind or precipitation. I thus excluded those pitfall arrays from the results.

Much morphological variation was observed for *Peromyscus maniculatus* (Appendix 5). This was largely due to the captures of various age and sex classes (i.e male, female, immature, adult). No other species was captured in sufficient quantity to assess variation in morphology.

Artemisia tridentata and *Artemisia cana* were the primary sagebrush species encountered. Sagebrush densities varied both between and within sites. The maximum sagebrush density observed on a transect during 2003 was at the Coal Creek site in Prairie County (40.03%) and the minimum was at the Triple site in Valley County (12.79%) (Appendix 6). The maximum mean height observed was on a transect at the Coal Creek site in Prairie County (76.33 cm) and the minimum was at the Dog Creek site in Valley County (30.14 cm). The maximum sagebrush density observed on a transect during 2004 was at the Brown's Gulch site in Beaverhead County (43.51%) and the minimum was at the Silvertip Creek site in Carbon County (10.1%) (Appendix 6). The maximum mean height observed during 2004 was also on a transect at the Brown's Gulch site (139.17cm) and the minimum was at the Red Butte site in Beaverhead County (37.93 cm). The only species captured in sufficient quantity for an analysis of habitat associations based on recorded vegetation characteristics was *Peromyscus maniculatus*. As in 2002, this species was encountered in such ubiquity that an analysis would be fruitless (Carlson 2002). Moreover, this species is already known to occur commonly in nearly all Montana habitats (Foresman 2001b).

DISCUSSION

Peromyscus maniculatus is one of the most abundant and widespread small mammals in North America and occurs throughout the state of Montana (Foresman 2001b). This species is easily captured with baited traps and thus accounted for the vast majority of captures during this study (96.69% in 2003 and 94.22% in 2004). During the 2002 sampling effort the majority (>81%) of captures were also *P. maniculatus* (Carlson 2002), however this is a substantially smaller proportion of the total captures than I observed during 2003 and 2004. Major population fluctuations are not characteristic of this species, however environmental changes can cause variation in numbers between years (Foresman 2001b). It is uncertain whether the observed difference in proportional *P. maniculatus* captures reflects temporal changes in annual abundance or a spatial difference between sampling sites.

Although other species were only infrequently captured, among these were tentatively 3 *Sorex* species, one of which appears on the Montana Natural Heritage Program's Species of Concern List. *Sorex merriami* is a species of concern and apparently associated with sagebrush habitats in Montana. Three *S. merriami* specimens were collected during this study. Foresman (2001b) reported only 9 specimens previously collected the state. 2 *Sorex monticolus* specimens were also collected during the 2003 survey. Three of these specimens represent county records in Montana. *S. merriami* was documented for the first time in Powder River County and the *S. monticolus* specimens were documented for the first time in Valley and Garfield Counties. The occurrence of *S. merriami* in Powder River County was previously considered probable, but undocumented according to Foresman (2001b). However, it was not considered probable for *S. monticolus* to occur in either Valley or Garfield Counties (Foresman 2001b). Additionally, an unidentified *Sorex* species was captured in 2004. Because of the paucity of occurrence information available for *S. merriami*, it is considered rare in the state of Montana (Foresman 2001b). However, this may be due simply to the lack of effort to locate and study *Sorex* species across

much of the state. Nonetheless, the current status and lack of information on this and other *Sorex* species in Montana warrant further investigation into their distribution and abundance.

The only other encounters of interest were 2 live-captured *Lemmys curtatus*. One of these captures occurred at the 2003 Bannack site in Beaverhead county and one at the 2004 Eighteenmile Peak site in Beaverhead county. This species has previously been documented in Beaverhead County (Foresman 2001b) and is not considered a species of concern. However, these two encounters are significant in that they mark the only captures of the species during the three years (2002-2004) of this project (see Carlson 2002), despite the species known association with sagebrush habitats in Montana.

Peromyscus leucopus occurs in portions of southeastern Montana in sympatry with its congener, *Peromyscus maniculatus*. Due to the overlap in morphological characteristics these species can be difficult to separate in the field (Foresman 2001a, Foresman 2001b). *P. leucopus* is associated with structurally complex habitats and canopy cover (Foresman 2001b). Riparian areas with deciduous cottonwood (*Populus* spp.) forests are used in southeastern Montana (Hoffman and Pattie 1968, Foresman 2001b). During the course of this study, I did not observe *Peromyscus* specimens that exhibited the characteristics of *P. leucopus*. Also, only one site appeared to have appropriate habitat within the range of the species, and there only marginally so (Powder River site, Custer County). The difficulty of distinguishing between these species leaves open the possibility that some *P. leucopus* specimens were mistakenly identified as *P. maniculatus* in the field at that site. I believe the potential for such confusion to be minimal however, both because of the habitat sampled and the lack of specimens exhibiting morphological traits characteristic of the former species. The Montana Natural Heritage Program zoologist reached this conclusion for the 2002 sampling effort as well and determined that all *Peromyscus* captures during that year were *P. maniculatus* (J. Carlson pers. comm.).

The sagebrush stands I selected did not always have a high density and were often limited in area due to the difficulty of locating accessible sites within some regions. Even when dense and expansive sagebrush stands were located near roads in some areas, they often occurred on privately owned land. In those situations I was typically unable to locate the landowner while in the field, and was forced to select less desirable stands on public land for sampling. Also in some cases, poor road conditions resulting from precipitation prevented me from accessing preferable sagebrush stands (notably in southern Valley County during 2003). However, the sagebrush densities in 2003 and 2004 were similar to those observed during the 2002 field season (Carlson 2002, Appendix 6).

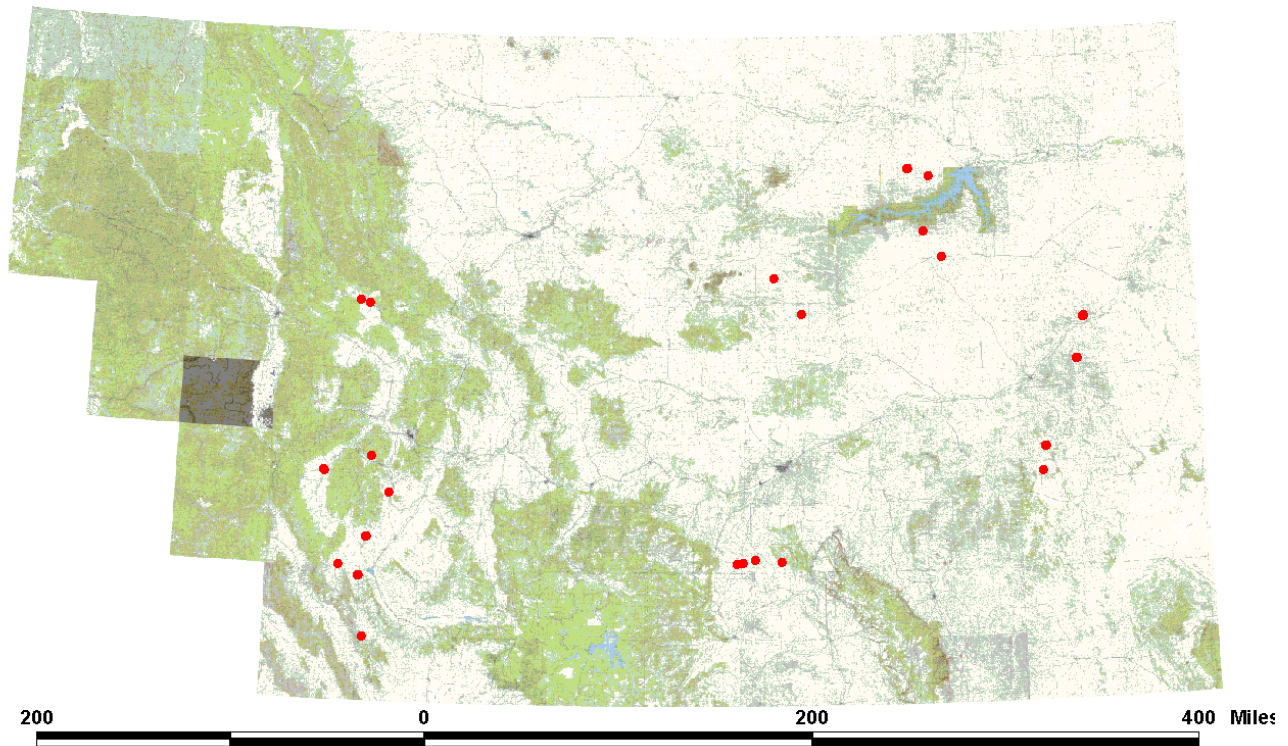
Based on these results and my observations during 2003 and 2004, I recommend minor changes in methodology for future field seasons. *Peromyscus maniculatus* is known to occur in most habitats throughout the state of Montana (Foresman 2001b). This species has accounted for the vast majority of captures during all three years of this study. Because this information contributes little to our understanding of the distribution of sagebrush associated small mammals in Montana, I suggest altering the field methodology such that the likelihood of capturing species of greater interest than *P. maniculatus* is increased. For example, in 2003 40% (n=4) of the non-*Peromyscus* species captured, were captured in pitfall arrays. Moreover, 50% (n=4) of the pitfall captures were non-*Peromyscus* species, while only 2% (n=6) of the bait station (i.e. Sherman traps and snap traps) captures were non-*Peromyscus* species. Although 60% (n=6) of the non-*Peromyscus* species were captured at bait stations, the effort required to run these stations is substantially greater than that required for pitfall arrays because they require attendance. Setting pitfall arrays is time consuming initially, but they may be left unattended for relatively long periods of time without decreasing their effectiveness. *Sorex* species are among the most poorly known sagebrush associates in Montana. All *Sorex* captures during 2003 and 2004 (n=5) were captured in pitfall traps. These were the most significant captures during 2003 and 2004.

Additionally, the chances of capturing sagebrush-associated reptile species on the Montana Natural Heritage Program's Species of Concern list (none of which were captured during 2003) might increase with an increase in pitfall-trapping effort. If more pitfall arrays were used at a greater number of sites, the proportion of non-*Peromyscus* captures per unit effort might increase. In particular, captures of the poorly known *Sorex* species in Montana might increase.

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APPENDIX 1. SITE MAP – SAMPLING LOCATIONS



APPENDIX 2: SITE DEFINITIONS

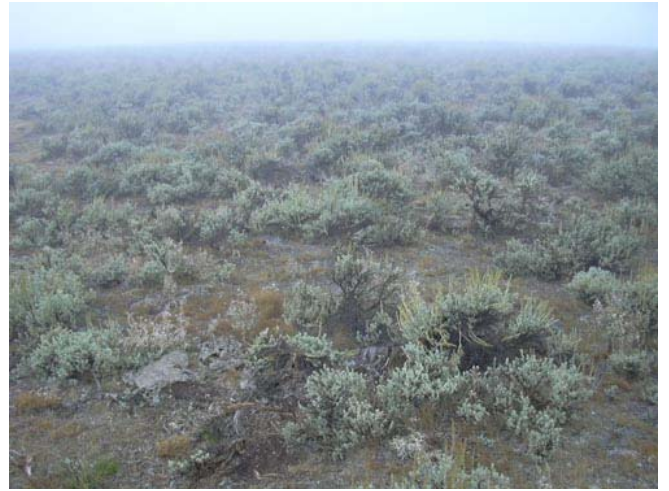
	Start_Lat	Start_Long	End-Lat	End-Long	Elev (m)	County	Dates Sampled
BAN-1	45 13' 16.94"	-112 56' 19.52"	45 13' 13.72"	-112 56' 19.79"	2200	BEAVERHEAD	31July- 02Aug
BAN-2	45 13' 16.87"	-112 56' 19.02"	45 13' 13.70"	-112 56' 19.19"	2200	BEAVERHEAD	31July- 02Aug
BAN-3	45 13' 16.83"	-112 56' 18.57"	45 13' 13.70"	-112 56' 18.69"	2200	BEAVERHEAD	31July- 02Aug
BAN-4	45 13' 16.85"	-112 56' 18.09"	45 13' 13.78"	-112 56' 18.23"	2200	BEAVERHEAD	31July- 02Aug
Trapline	Start_Lat	Start_Long	End-Lat	End-Long	Elev(m)	County	Dates Sampled
BAS-1	45 53' 08.78"	-105 42' 05.56"	45 53' 05.63"	-105 42' 04.29"	900	CUSTER	12Aug-14Aug
BAS-2	45 53' 08.01"	-105 42' 08.34"	45 53' 05.07"	-105 42' 06.39"	900	CUSTER	12Aug-14Aug
BAS-3	45 53' 07.51"	-105 42' 09.54"	45 53' 04.28"	-105 42' 08.61"	900	CUSTER	12Aug-14Aug
BAS-4	45 53' 05.03"	-105 42' 13.34"	45 53' 01.79"	-105 42' 14.19"	900	CUSTER	12Aug-14Aug
Trapline	Start_Lat	Start_Long	End-Lat	End-Long	Elev (m)	County	Dates Sampled
BIG-1	45 41' 54.47"	-113 24' 40.71"	45 41' 52.59"	-113 24' 37.02"	1850	BEAVERHEAD	3Aug-5Aug;28Aug-30Aug
BIG-2	45 41' 54.91"	-113 24' 40.67"	45 41' 57.65"	-113 24' 38.31"	1850	BEAVERHEAD	3Aug-5Aug;28Aug-30Aug
BIG-3	45 41' 55.05"	-113 24' 41.58"	45 41' 57.77"	-113 24' 43.93"	1850	BEAVERHEAD	3Aug-5Aug;28Aug-30Aug
BIG-4	45 41' 54.47"	-113 24' 41.88"	45 41' 54.20"	-113 24' 46.50"	1850	BEAVERHEAD	3Aug-5Aug;28Aug-30Aug
BIGDF-1	45 41' 55.97"	-113 24' 40.32"	.	.	1850	BEAVERHEAD	3Aug-30Aug
BIGDF-2	45 41' 51.76"	-113 24' 35.29"	.	.	1850	BEAVERHEAD	3Aug-30Aug
Trapline	Start_Lat	Start_Long	End-Lat	End-Long	Elev (m)	County	Dates Sampled
COAL-1	46 50' 43.14"	-105 14' 00.42"	46 50' 44.49"	-105 13' 56.08"	700	PRAIRIE	18Aug-20Aug
COAL-2	46 50' 44.88"	-105 13' 55.42"	46 50' 46.21"	-105 13' 51.02"	700	PRAIRIE	18Aug-20Aug
COAL-3	46 50' 46.04"	-105 13' 49.01"	46 50' 43.64"	-105 13' 45.76"	700	PRAIRIE	18Aug-20Aug
COAL-4	46 50' 43.93"	-105 13' 55.86"	46 50' 40.98"	-105 13' 53.78"	700	PRAIRIE	18Aug-20Aug
Trapline	Start_Lat	Start_Long	End_Lat	End_Long	Elev (m)	County	Dates Sampled
DOG-1	47 55' 59.20"	-106 52' 21.36"	47 56' 01.33"	-106 52' 18.12"	700	VALLEY	25Sept-27Sept;18Oct-20Oct
DOG-2	47 55' 55.57"	-106 52' 12.74"	47 55' 58.44"	-106 52' 11.32"	700	VALLEY	25Sept-27Sept;18Oct-20Oct
DOG-3	47 55' 58.84"	-106 52' 12.40"	47 56' 00.25"	-106 52' 16.75"	700	VALLEY	25Sept-27Sept;18Oct-20Oct
DOG-4	47 55' 57.72"	-106 52' 13.46"	47 55' 58.80"	-106 52' 18.16"	700	VALLEY	25Sept-27Sept;18Oct-20Oct
DOGDf-1	47 55' 59.57"	-106 52' 18.72"	.	.	700	VALLEY	25Sept-20Oct
DOGDf-2	47 55' 57.01"	-106 52' 14.20"	.	.	700	VALLEY	25Sept-20Oct
Trapline	Start_Lat	Start_Long	End_Lat	End_Long	Elev (m)	County	Dates Sampled
HELL-1	47 31' 13.87"	-106 56' 32.11"	47 31' 11.94"	-106 56' 28.21"	850	GARFIELD	12Aug-14Aug
HELL-2	47 31' 12.91"	-106 56' 32.73"	47 31' 14.78"	-106 56' 36.77"	850	GARFIELD	12Aug-14Aug
HELL-3	47 31' 15.44"	-106 56' 39.26"	47 31' 18.66"	-106 56' 39.43"	850	GARFIELD	12Aug-14Aug
HELL-4	47 31' 20.94"	-106 56' 32.29"	47 31' 17.75"	-106 56' 31.46"	850	GARFIELD	12Aug-14Aug
Trapline	Start_Lat	Start_Long	End-Lat	End-Long	Elev (m)	County	Dates Sampled
JORD-1	47 19' 33.14"	-106 45' 06.27"	47 19' 32.08"	-106 45' 01.73"	800	GARFIELD	22Sept-24Sept;15-17Oct
JORD-2	47 19' 32.14"	-106 44' 59.74"	47 19' 29.07"	-106 45' 01.48"	800	GARFIELD	22Sept-24Sept;15-17Oct
JORD-3	47 19' 30.17"	-106 44' 59.70"	47 19' 26.86"	-106 44' 59.57"	800	GARFIELD	22Sept-24Sept;15-17Oct
JORD-4	47 19' 27.73"	-106 44' 58.82"	47 19' 28.39"	-106 44' 54.07"	800	GARFIELD	22Sept-24Sept;15-17Oct
JORDDf-1	47 19' 32.21"	-106 45' 02.81"	.	.	800	GARFIELD	22Sept-17Oct
JORDDf-2	47 19' 28.68"	-106 45' 07.24"	.	.	800	GARFIELD	22Sept-17Oct

Trapline	Start_Lat	Start_Long	End-Lat	End-Long	Elev(m)	County	Dates Sampled
POW-1	46 31' 58.78"	-105 19' 30.98"	46 31' 57.57"	-105 19' 26.58"	750	CUSTER	21Aug-23Aug;19Sept-21Sept
POW-2	46 31' 58.49"	-105 19' 31.70"	46 31' 56.75"	-105 19' 27.30"	750	CUSTER	21Aug-23Aug;19Sept-21Sept
POW-3	46 31' 58.38"	-105 19' 33.17"	46 31' 56.43"	-105 19' 29.27"	750	CUSTER	21Aug-23Aug;19Sept-21Sept
POW-4	46 31' 59.11"	-105 19' 26.72"	46 32' 02.24"	-105 19' 25.96"	750	CUSTER	21Aug-23Aug;19Sept-21Sept
Trapline	Start_Lat	Start_Long	End-Lat	End-Long	Elev (m)	County	Dates Sampled
PUMP-1	45 42' 14.80"	-105 44' 14.81"	45 42' 16.58"	-105 44' 19.04"	950	POWDER RIVER	15Aug-17Aug;16Sept-18Sept
PUMP-2	45 42' 14.71"	-105 44' 19.28"	45 42' 16.85"	-105 44' 23.70"	950	POWDER RIVER	15Aug-17Aug;16Sept-18Sept
PUMP-3	45 42' 11.83"	-105 44' 16.67"	45 42' 14.09"	-105 44' 19.97"	950	POWDER RIVER	15Aug-17Aug;16Sept-18Sept
PUMP-4	45 42' 11.21"	-105 44' 18.95"	45 42' 12.22"	-105 44' 23.35"	950	POWDER RIVER	15Aug-17Aug;16Sept-18Sept
PUMPP1	45 42' 10.98"	-105 44' 29.18"	.	.	950	POWDER RIVER	15Aug-18Sept
PUMPP2	45 42' 11.91"	-105 44' 25.36"	.	.	950	POWDER RIVER	15Aug-18Sept
Trapline	Start_Lat	Start_Long	End_Lat	End_Long	Elev (m)	County	Dates Sampled
TRI-1	47 59' 20.07"	-107 05' 59.15"	47 59' 19.84"	-107 05' 54.19"	700	VALLEY	10Oct-12Oct
TRI-2	47 59' 20.30"	-107 05' 53.07"	47 59' 19.57"	-107 05' 48.28"	700	VALLEY	10Oct-12Oct
TRI-3	47 59' 17.83"	-107 05' 42.91"	47 59' 19.55"	-107 05' 47.20"	700	VALLEY	10Oct-12Oct
TRI-4	47 59' 17.21"	-107 05' 43.26"	47 59' 16.07"	-107 05' 47.56"	700	VALLEY	10Oct-12Oct

APPENDIX 3: SITE PHOTOGRAPHS



ABOVE: Bannack Trap Site (Beaverhead Co.)



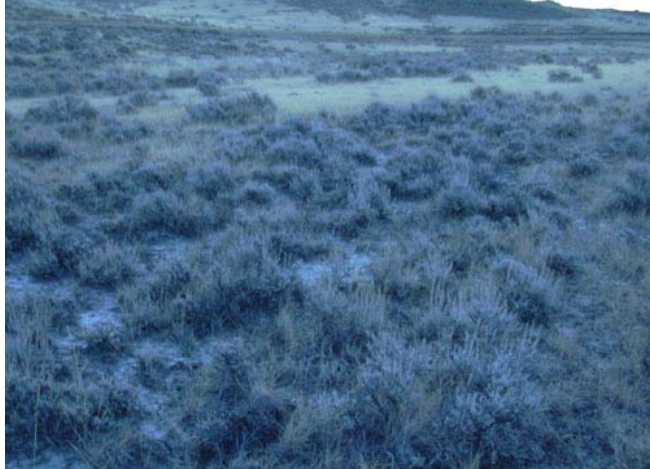
ABOVE: Bighole Trap Site (Beaverhead Co.)



ABOVE: Basin Trap Site (Custer Co.)



ABOVE: Coal Creek Trap Site (Prairie Co.)



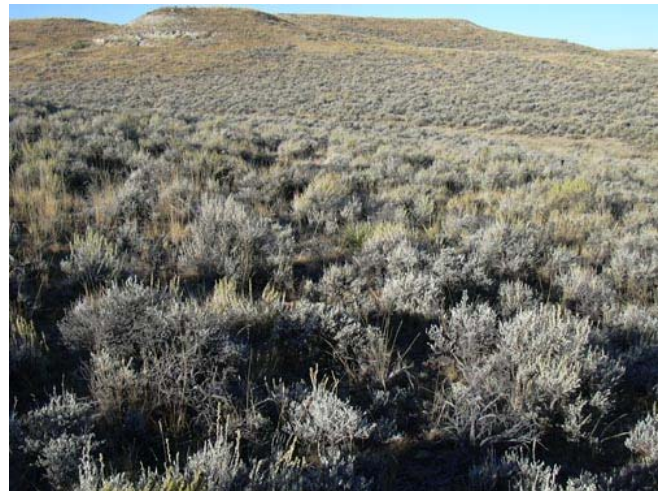
ABOVE: Hells Creek Trap Site (Garfield Co.)



ABOVE: Jordan Trap Site (Garfield Co.)



ABOVE: Powder River Trap Site (Custer Co.)



ABOVE: Pumpkin Creek Trap Site (Powder River Co.)



LEFT: Triple Trap Site (Valley Co.)

APPENDIX 4: CAPTURE SUMMARY

Bait Station Captures (Sherman/Snap Trap Captures)															
COUNTY	SITE	PEMA	PEPA	PEFA	ONLE	MIMO	MIPE	SOCI	SOME	SOMO	SOPR	TAMI	LECU	TRAPNIGHTS	
BEAVERHEAD	BANNACK	2	0	0	0	0	0	0	0	0	0	2	1	240	
BEAVERHEAD	BIGHOLE	66	0	0	0	1	0	0	0	0	0	0	0	480	
CUSTER	BASINCREEK	16	0	0	0	0	0	0	0	0	0	0	0	240	
CUSTER	POWDERRIVER	78	0	0	0	0	0	0	0	0	0	0	0	480	
GARFIELD	HELLS CREEK	18	0	0	0	0	0	0	0	0	0	0	0	240	
GARFIELD	JORDAN	34	0	0	0	0	0	0	0	0	0	0	0	480	
POWDER RIVER	PUMPKIN	24	0	2	0	0	0	0	0	0	0	0	0	480	
PRAIRIE	COALCREEK	8	0	0	0	0	0	0	0	0	0	0	0	240	
VALLEY	DOGCREEK	23	0	0	0	0	0	0	0	0	0	0	0	480	
VALLEY	TRIPLE	19	0	0	0	0	0	0	0	0	0	0	0	240	
TOTAL		288	0	2	0	1	0	0	0	0	0	2	1	3600	

Pitfall Captures															
COUNTY	SITE	PEMA	PEPA	PEFA	ONLE	MIMO	MIPE	SOCI	SOME	SOMO	SOPR	TAMI	LECU	TRAPNIGHTS	
BEAVERHEAD	BIGHOLE	0	0	0	0	0	1	0	0	0	0	0	0	56	
VALLEY	DOGCREEK	0	0	0	0	0	0	0	0	1	0	0	0	52	
GARFIELD	JORDAN	1	0	0	0	0	0	0	0	1	0	0	0	52	
POWDER RIVER	PUMPKIN	3	0	0	0	0	0	0	1	0	0	0	0	70	
TOTAL		4	0	0	0	0	1	0	1	2	0	0	0	230	

Cumulative Captures (Combined Pitfall and Bait Station Captures)														
COUNTY	SITE	PEMA	PEPA	PEFA	ONLE	MIMO	MIPE	SOCI	SOME	SOMO	SOPR	TAMI	LECU	TOTAL
BEAVERHEAD	BANNACK	2	0	0	0	0	0	0	0	0	0	2	1	5
BEAVERHEAD	BIGHOLE	66	0	0	0	1	1	0	0	0	0	0	0	68
CUSTER	BASINCREEK	16	0	0	0	0	0	0	0	0	0	0	0	16
CUSTER	POWDERRIVER	78	0	0	0	0	0	0	0	0	0	0	0	78
GARFIELD	HELLS CREEK	18	0	0	0	0	0	0	0	0	0	0	0	18
GARFIELD	JORDAN	35	0	0	0	0	0	0	0	1	0	0	0	36
POWDER RIVER	PUMPKIN	27	0	2	0	0	0	0	1	0	0	0	0	30
PRAIRIE	COALCREEK	8	0	0	0	0	0	0	0	0	0	0	0	8
VALLEY	DOGCREEK	23	0	0	0	0	0	0	0	1	0	0	0	24
VALLEY	TRIPLE	19	0	0	0	0	0	0	0	0	0	0	0	19
TOTAL		292	0	2	0	1	1	0	1	2	0	2	1	302
% of Grand Total		96.69	0.00	0.66	0.00	0.33	0.33	0.00	0.33	0.66	0.00	0.66	0.33	

PEMA: *Peromyscus maniculatus*; Deer Mouse

PEPA: *Perognathus parvus*; Great Basin Pocket Mouse

PEFA: *Perognathus fasciatus*; Olive-backed Pocket Mouse

ONLE: *Onychomys leucogaster*; Northern Grasshopper Mouse

MIMO: *Microtis montanus*; Montane Vole

MIPE: *Microtus pennsylvanicus*; Meadow Vole

LECU: *Lemmys curtatus*; Sagebrush Vole

TAMI: *Tamias minimus*; Least Chipmunk

SOCI: *Sorex cinereus*; Masked Shrew

SOME: *Sorex merriami*; Merriam's Shrew

SOMO: *Sorex monticolus*; Dusky Shrew

SOPR: *Sorex preblei*; Preble's Shrew

APPENDIX 5: CUMULATIVE MORPHOMETRICS

Species	Sex	Total Length (mm)	Tail Length (mm)	Hind foot Length (mm)	Mass (g)
LECU	F		21	18	21
N		0	1	1	1
MEAN			21	18	21
SD					
Species	Sex	Total Length (mm)	Tail Length (mm)	Hind foot Length (mm)	Mass (g)
MIMO	M	149	38	19	38
N		1	1	1	1
MEAN		149	38	19	38
SD					
Species	Sex	Total Length (mm)	Tail Length (mm)	Hind foot Length (mm)	Mass (g)
MIPE	F	138	32	17	29
N		1	1	1	1
MEAN		138	32	17	29
SD					
Species	Sex	Total Length (mm)	Tail Length (mm)	Hind foot Length (mm)	Mass (g)
PAFA	M	130	61	16	10
PAFA	M	136	62	17	12
N		2	2	2	2
MEAN		133	61.5	16.5	11
SD		4.242640687	0.707106781	0.707106781	1.414213562
Species	Sex	Total Length (mm)	Tail Length (mm)	Hind foot Length (mm)	Mass (g)
PEMA*					
N		248	292	292	292
MEAN		149.4193548	62.9760274	18.90410959	19.01027397
SD		12.0924889	7.63803833	1.231481477	3.667901625
Species	Sex	Total Length (mm)	Tail Length (mm)	Hind foot Length (mm)	Mass (g)
SOME	F	80	33	11	4
N		1	1	1	1
MEAN		80	33	11	4
SD					

Species	Sex	Total Length (mm)	Tail Length (mm)	Hind foot Length (mm)	Mass (g)
SOMO	F	72	32	9	2
SOMO	U	88	35	11	3
N		2	2	2	2
MEAN		80	33.5	10	2.5
SD		11.3137085	2.121320344	1.414213562	0.707106781
Species	Sex	Total Length (mm)	Tail Length (mm)	Hind foot Length (mm)	Mass (g)
TAMI	M		86	32	46
TAMI	M		82	30	44
N		0	2	2	2
MEAN			84	31	45
SD			2.828427125	1.414213562	1.414213562
Note: Total length not recorded for live specimens					
Note: Recaptured individuals not measured at second capture					

* Full list of PEMA records are located in the Montana Natural Heritage Program project file

APPENDIX 6: SITE VEGETATION SUMMARY

Site	Transect	% Sage Cover	Mean Sage Height (cm)	Site	Transect	% Sage Cover	Mean Sage Height (cm)
BANNACK	1	33.28	42.67	HELLSCREEK	1	26.30	63.78
	2	27.97	63.00		2	17.50	70.48
	3	26.63	57.51		3	26.53	59.04
	4	31.38	51.83		4	23.67	58.74
BASIN	1	18.63	51.00	JORDAN	1	16.89	37.57
	2	21.81	54.03		2	14.71	51.30
	3	27.58	58.48		3	14.08	51.41
	4	35.34	64.25		4	25.16	58.86
BIGHOLE	1	26.64	49.74	POWDERRIVER	1	23.53	59.71
	2	33.52	62.30		2	23.96	64.67
	3	28.57	49.47		3	27.77	56.56
	4	23.39	48.36		4	20.62	62.26
COALCREEK	1	32.19	69.88	PUMPKIN	1	18.99	56.42
	2	29.40	69.93		2	18.67	47.56
	3	36.18	67.55		3	16.06	51.74
	4	40.03	76.33		4	24.11	57.65
DOGCREEK	1	20.46	30.14	TRIPLE	1	29.51	63.02
	2	19.15	44.91		2	14.27	48.42
	3	15.25	43.31		3	13.98	57.60
	4	13.46	36.85		4	12.79	58.28